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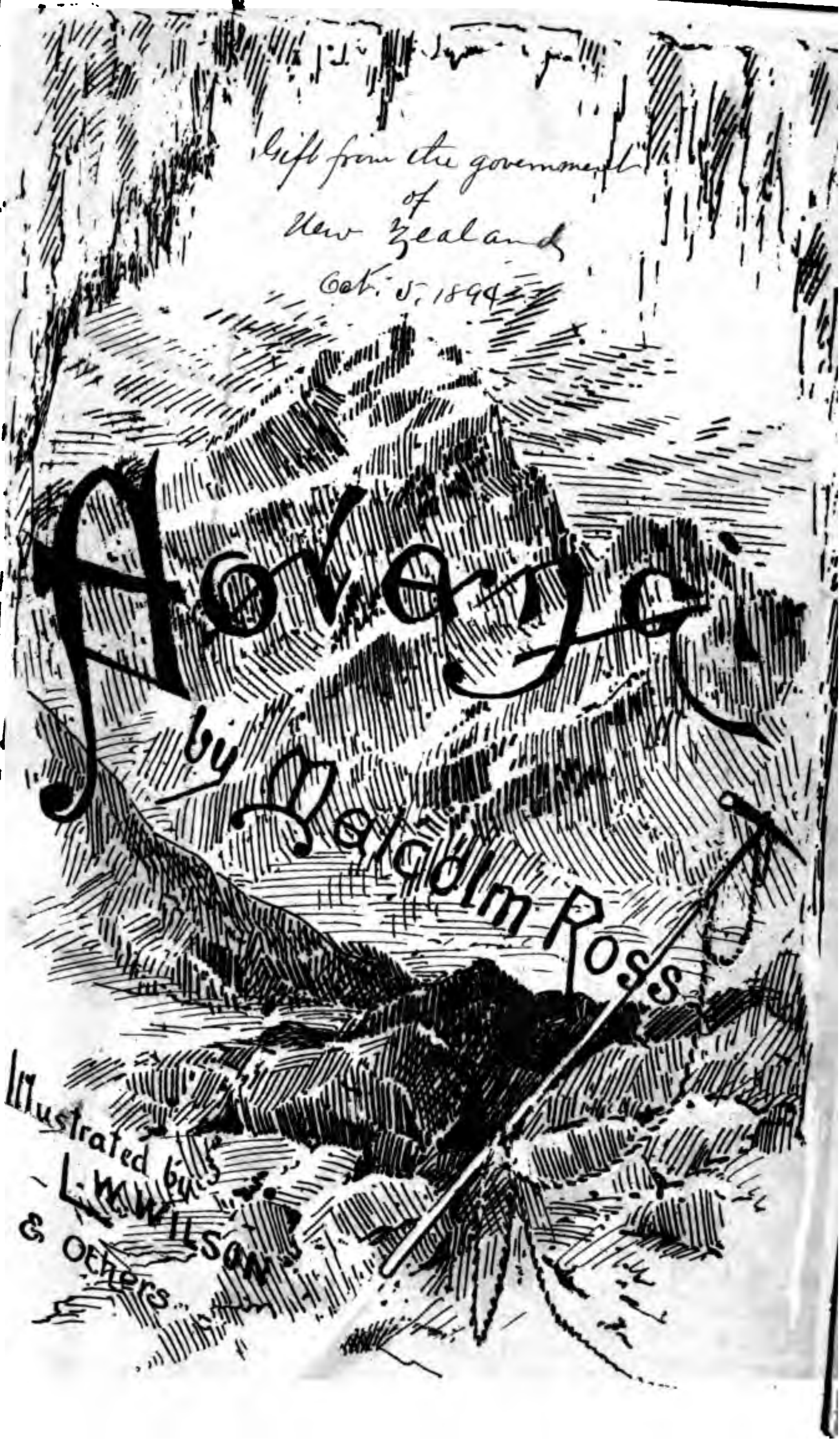

Aorangi

by Malcolm Ross

Illustrated by
L. W. Wilson
& Others

AORANGI;

46427

OR,

THE HEART OF THE SOUTHERN ALPS, NEW ZEALAND.

By MALCOLM ROSS,
VICE-PRESIDENT NEW ZEALAND ALPINE CLUB.

"*The superiority of the mountains to the lowlands is as immeasurable as the richness of a painted window matched with a white one, or the wealth of a museum compared with that of a small furnished chamber.*"—Ruskin.

FIRST EDITION.

WELLINGTON:
GEORGE DIDSBURY, GOVERNMENT PRINTER.
1892.

PREFACE.

THIS little book has been written at the instigation of the New Zealand Government, with the object of making more generally known to tourists the scenic attractions of the Mount Cook district. The journey to Mount Cook is now easy of accomplishment, and no visitor to the colony should leave without paying a visit to the Hermitage, which is situated right in the heart of the Southern Alps, and from which point he will be able to command views of alpine scenery such as cannot be surpassed in any part of the world.

In the carrying-out of this work I am indebted to the Hon. John McKenzie, Minister of Lands, for the facilities afforded me. The illustrations are principally by Mr. L. W. Wilson, whose clever pen-and-ink sketches have been excellently reproduced by Mr. D. Ross, the Photo-lithographer of the Survey Department at Wellington. I wish also to express my indebtedness to Mr. Huddleston for placing a number of his sketches at my disposal, and to Messrs. Wheeler, of Christchurch, Morris, of Dunedin, and A. Harper, the Secretary of the New Zealand Alpine Club, for permission to use their photographs for illustrative purposes. The maps, which are compiled and drawn in the Lands and Survey Department, speak for themselves.

M. R.

Dunedin, December, 1891.

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AORANGI;

OR,

THE HEART OF THE SOUTHERN ALPS.

CHAPTER I.

INTRODUCTORY.

THE SOUTHERN ALPS—SCENERY OF THE WEST COAST SOUNDS —A NEW FIELD FOR EXPLORATION—THE COLD LAKES— MOUNTS EARNSLAW AND ASPIRING.

SCIENTISTS tell us that it is a good thing for a country to have mountains; and some one has added that, having mountains, it is almost a necessity to go up them—else, why have they tops? "From the book of Psalms," says the same authority, "to the *Alpine Journal*, from the old masters to Turner, and from Turner to M. Loppé, we have the same tale of the glory of the hills." The marvels of the Alps of Switzerland, of France, and of Italy have been known to the civilised world for centuries. Tourists flock to them every year in thousands and tens of thousands. They are the playground of the Continent and Great Britain, and a source of considerable revenue to Switzerland. In the same way there is no reason why the Alps of New Zealand should not be the playground of Australasia.

The scenery of the Southern Alps of New Zealand in many instances excels in beauty and grandeur that of the Alps of Switzerland, while in the former there is far greater variety. Then, again, there is the charm of novelty. Every tourist delights in getting out of the beaten track. In Switzerland this is hardly possible nowadays. In New Zealand, on the other hand, it is easy of accomplishment. In the Swiss Alps there is now hardly a peak unclimbed—one after another having gone down before the indomitable pluck and perseverance of the members of the English Alpine Club; in New Zealand, on the other hand, though several have tried, no one has actually succeeded in making a complete ascent of any of our highest mountains; and there are scores of splendid peaks awaiting the enterprise of the British or Colonial mountaineer, and ready to be won. Many of the peaks, and most of the glaciers, are, as yet, unnamed, and there is still in parts of the South Island a fine field for exploration and discovery—geographical, geological, and botanical. The wonders of the Southern Alps are only beginning to be known; but the more they are known the more they are appreciated; and it is safe to predict that in a very few years we shall have sight-seekers in large numbers, and from all parts of the world, flocking to the Switzerland of Australasia. The snow-line in New Zealand being so much lower than in Switzerland, the scenery, though the mountains are not quite so high, is of surpassing grandeur, and the largest glaciers are easily accessible.

In the south, in the region of the West Coast Sounds, there are beautful lakes, waterfalls, and mountains, while the scenery of the sounds is said to rival that of the fiords of Norway. A great tract of mountainous country lying between these sounds and Lakes Manapouri and Te Anau is still marked on the maps as "Unexplored," and among these mountain fastnesses discoveries of importance may yet be made. It has long been a popular belief that the unknown country lying behind Lakes Manapouri and Te Anau was inhabited by a tribe of Maoris. Tradition has it that the northern Maoris, under one of their warlike chiefs, drove some of the southern tribes to the shores of Lake Te Anau, where a terrible battle was fought, and it was supposed that the remnant of this tribe had retreated back into the mountains. Many relics of a lost tribe, in the shape of greenstone implements and ornaments (of which Mr. Mitchell, of Manapouri Station, has a unique and interesting collection) have been found on the shores of Manapouri and Te Anau, but the Maoris themselves have evidently gone to that bourne whence no traveller returns.

It is only of recent years that passes have been discovered between the lakes and the sounds, and, although these passes do not lead the traveller beyond the sub-alpine heights, they take him through scenery of the most beautiful and wonderful character—a fitting introduction to the greater marvels of the Ice King's home in the heart of the Southern Alps, at Aorangi, or Mount Cook.

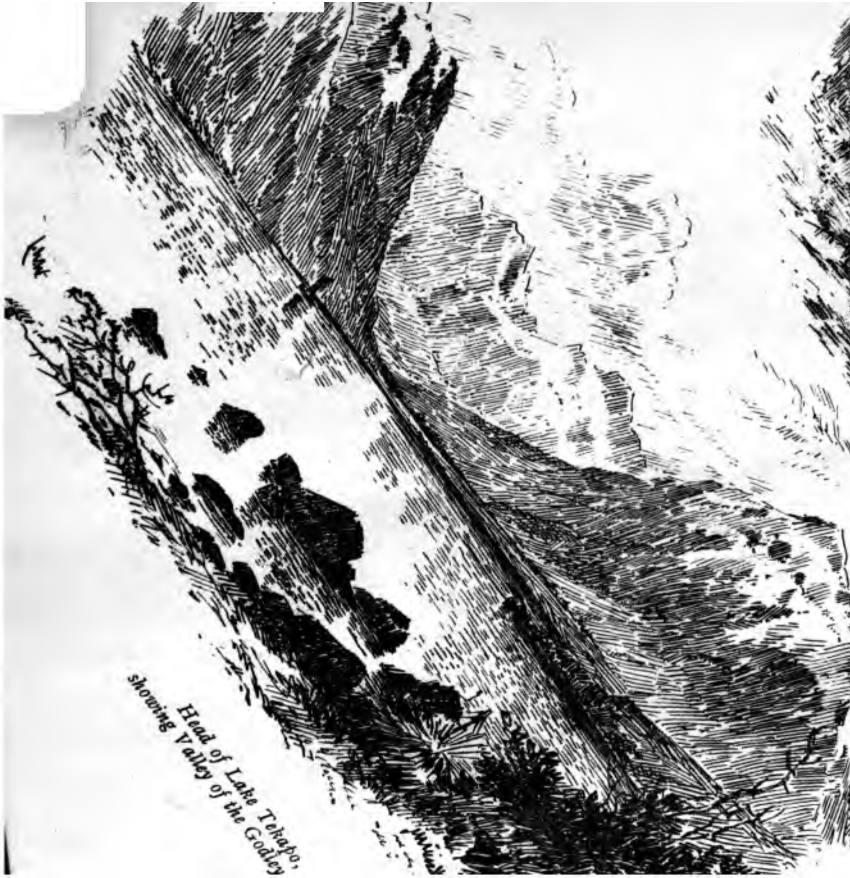
The Southern Alps extend in one almost unbroken chain along the west side of the South Island of New Zealand. In the South, in the vicinity of the sounds and of Lake Te Anau, there is a large number of magnificent peaks, which, though they are not of great height, are, owing to their southerly position, nearly all crowned with perpetual snow and ice. As we go further north the mountains increase in height, till at Lake Wakatipu we have Mount Earnslaw and his satellites, and at Lake Wanaka, Mount Aspiring—which has aptly been termed the New Zealand Matterhorn—nearly 10,000ft. in height. Northward, beyond this, a fine chain of peaks runs as the back-bone of the South Island to where Mount Cook or Aorangi towers majestic 12,000ft. in air. At Mount Cook we are in the midst of the grandest scenes of the Southern Alps, and here it is that the tourist, if he would see the wonders daily being worked by the Ice King on such a vast scale, must come. Hitherto it was a matter of considerable expense and difficulty to visit this locality. Now all that is changed, and from either Dunedin or Christchurch there is only a train-journey of half a day, and two days' coaching (shortly to be reduced to one), while there is excellent accommodation at the end of the journey. In the subsequent pages I shall endeavour to give the reader reliable information regarding the different routes to Mount Cook, and some idea of what is to be seen when there.

CHAPTER II.

HOW TO GET TO MOUNT COOK.

The Journey *viâ* Lakes Wakatipu and Wanaka—*Viâ* Oamaru—*Viâ* Timaru—Coaching from Fairlie Creek—Arrival at the Hermitage—Various Expeditions.

There are now three different routes by which the tourist can get to Mount Cook. We shall suppose that he has come from Australia in one of the magnificent steamers of the Union Steamship Company, and landed at the Bluff, which is the nearest port to Melbourne. He can, providing he has plenty of time at his disposal, proceed to Mount Cook by way of the cold lakes, visiting Manapouri, Te Anau, Wakatipu, Wanaka, Hawea, Ohau, and Pukaki Lakes *en route*. At Manapouri and Te Anau he will see some of the finest lake scenery in the world. At Lake Wakatipu he will find himself in a tourist's paradise, where there is every convenience that he can wish for. The journey up Lake Wakatipu, in the smart and comfortable paddle-steamer "Mountaineer," is a most pleasant and interesting one. The scenery on either side of the lower half of the lake is grand and imposing—the peaks of the Remarkables on the one hand, with Bayonet Peak, Mount Dirk, and a score of others equally fine towering up on the other. At Queenstown, where there is excellent hotel accommodation, the visitor can spend a few days very profitably. Then there is the steamer-journey to the head of the lake, where the scenery is on a still grander scale, Mount Earnslaw, with its fine glacier, dominating the whole scene. Many delightful excursions can be made from Glenorchy on the one side of the lake and Kinloch on the other. Returning to Queenstown, the traveller takes coach to Lake Wanaka, 41 miles. Here there is quite a different style of scenery, also grand, but, if anything, more beautiful than that of Lake Wakatipu. The ride up the Matukituki Valley from Glendhu Bay to Mount Aspiring, and the steamer trip up the lake to Manuka Island, with its own little lake, 400ft. above the level of the other lake, are excursions that once



Head of Lake Tekapo,
showing Valley of the Godley

In the Mackenzie Country.

Lake Pukaki and Mt. Cook.

made will never be forgotten. From Lake Wanaka a coach now runs through the Lindis Pass, *viâ* Lake Ohau, connecting with the Mount Cook coach at Lake Pukaki, the total distance being 122 miles, involving three days' coaching.

An alternative route is to proceed from the Bluff to Dunedin by train, 155 miles, thence *viâ* Oamaru to Kurow by train, and from that point by coach up the Waitaki River, *viâ* Omarama, Lake Ohau, and Lake Pukaki. By this route there is considerable variety of mountain, river, and lake scenery, and in the shooting-season good sport may be had among the rabbits and wild ducks.

The easiest and most expeditious way of reaching Mount Cook is, however, by way of Timaru and Fairlie Creek, proceeding to the latter place by train from either Christchurch or Dunedin; thence going by coach *viâ* Lakes Tekapo and Pukaki to the Hermitage, a snug and well-conducted hostelry, prettily situated within a few minutes' walk of the largest glaciers in the Southern Alps. Having planned with my wife an elaborate expedition to the glaciers of Aorangi in the autumn of 1890, I selected this route. We got to Fairlie Creek at 8 o'clock in the evening, having come through from Dunedin by train in nine hours.

Next morning a cheery "All aboard for Mount Cook!" makes us hurry over the remainder of an early breakfast which we have been discussing at a comfortable hotel. We lose little time in obeying this summons from the driver of our coach, and, having seen to our luggage, clambered up into the box-seat, and, snugly ensconced in a large opossum rug, we find ourselves behind a team of four spanking greys, bowling over a smooth gravel road, and at last fairly started on our expedition to the glaciers of Aorangi, and the Great Tasman Glacier in particular. It is a long drive of fifty-six miles from Fairlie Creek to Pukaki on the first day, but a pleasant break for luncheon occurs at Lake Tekapo—a charming spot on a calm summer's day. You step out into the hotel garden, and a few paces in front of you, lapping a rocky shore, are the beautiful turquoise-green waters of the lake, reflecting the clouds and the mountains. Horses are changed, and we then start off again on our long journey through the dreary yellow wastes of the Mackenzie Plains.

Lake Pukaki is our halting-place for the night. At sunset we sight its waters. Far up the valley, rising from the Tasman Flats, towers the great mass of Mount Cook, its final peak gleaming in the sunlight, and its snows reflected in the lake at our feet—here distinctly, and yonder more faintly, as the calm waters are ruffled by a passing breeze. Though the hotel fare is homely, we enjoy a good tea, and, having had another look at the lake and the distant Aorangi, we retire early to rest and sleep the sleep of the just, and the tired.

We are early on the road again next morning. Crossing the Pukaki River on a ferry-boat, worked by the current, we drive over the tussocky downs of Rhoboro' Station, and enter what appears to be the bed of an old river, that has no doubt at some distant date cut its way through this ancient lateral moraine, when the glacier of the Tasman Valley was three or four times its present size. The engineer who laid out this road must have been a thorough utilitarian, for he has availed himself of an old bullock-dray track, and succeeded admirably in making the road about as long and as rough as it possibly could be. It is on record that a tourist once sang out excitedly to the driver to stop, and, on the coach coming to a standstill, he got out and began to make a close scrutiny of the construction of the vehicle. The driver, a little puzzled, asked what was the matter, and received the laconic reply: "Oh, nothing, I merely wished to see if your wheels were *square*." For the first mile or two we thought this story a joke; then, after a few more miles, we began to think there might be some truth in it; and, latterly, we too found ourselves dubiously examining the wheels. It is all very well when you are nicely wedged in between a couple of really stout passengers on the box-seat, but when you have an angular tourist on your right, and an iron railing doing its level best to perform excision of the hip-joint on the left, it is quite a different matter. The Mount Cook Coaching Company, however, do all they can to make travellers comfortable, and in our case it was not altogether the fault of the road. The driver had something to do with it. He had just received what in these foreign parts is known as "the sack," and I regret to say that he had taken it neither with the grace of an Italian nobleman nor the politeness of a

Spanish grandee. On the contrary, I believe he even went the length of using a string of very strong adjectives. This was his last day on the road, and he said he meant to have a "picnic." His idea of what constituted a "picnic" did not altogether coincide with ours. It consisted mainly in a burning desire to get to his destination—in pieces, if necessary—about an hour before his usual time, and in driving down steep and stony parts of the road at a break-neck pace. The height of his enjoyment appeared to be reached on a steep incline leading towards the lake. Down this we rattled, over stones, and around sharp curves, at a pace that would have done credit to Yuba Bill; and we said never a word, but held our breath and the iron railing of the trap, till, with a sigh of relief, we reached the bottom and breathed freely again. To do our Jehu justice, however, we must admit that he *did* know how to "handle the ribbons."

This day there was no hotel or accommodation-house where we could refresh the inner man; so, soon after 12 o'clock, we halted and had an *al fresco* luncheon at a place known as "The Dog's Grave." There is a little patch of scrub on the flat, where fuel is obtainable, and a clear stream running past it supplies good water. Near at hand is the grave, with a little headboard, the whole enclosed with a stout wooden railing. The dog whose memory is here perpetuated belonged to the survey camp established some months previously, and his master, grieving over his untimely demise, gave him a decent funeral and an epitaph. We stayed about an hour and a half for lunch and then proceeded on our journey. All day long we were obtaining splendid views of the mountains ahead—Mount Cook, St. David's Dome, De la Bêche, and Elie de Beaumont (with whose forms, from a close study of maps and photographs, we were quite familiar) being prominent features in the landscape. Nearing Birch Hill we got a distant view of the Tasman Glacier, and could easily distinguish the white ice of the Hochstetter coming down into it on the left from Mount Cook. Our driver fulfilled his promise, and landed us at the Hermitage in the evening considerably before contract time.

The Hermitage is prettily situated at the foot of the ancient lateral moraine of the Mueller Glacier, now covered with bush, and from the dining-room window you can look right out on to the steep sides of Mount Sefton, with its splendid hanging glaciers. Mount Cook itself is hidden, but a good view of the Hooker side of it is obtainable by going a few hundred yards down the road.

Numerous interesting expeditions can be made from the Hermitage. The Mueller Glacier is only a few hundred yards away, and is easily accessible even to ladies. Then there is the Hooker Glacier, to which a track is being formed, also within easy distance; while further afield we have the Great Tasman Glacier, and its big brother the Murchison, as yet little frequented by tourists. These are only a few of the many expeditions that can be undertaken from the Hermitage.

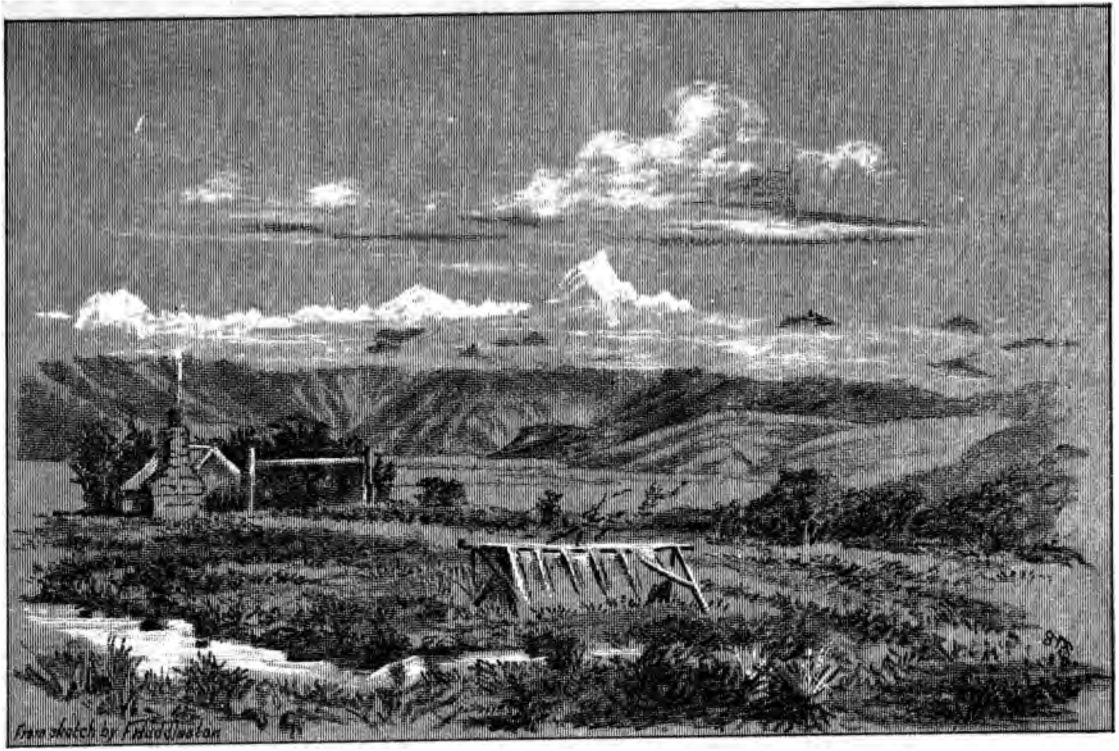
CHAPTER III.

AN EXPEDITION TO THE TASMAN GLACIER.

PREPARATIONS—WE START UP THE TASMAN GLACIER—THE BLUE LAKE—KEA-HUNTING—OUR DESTINATION—RETURN TO THE HERMITAGE—CROSSING THE HOOKER—WE BIVOUAC UNDER AN ALPINE PINE—GREAT EXTENT OF THE MORAINE—CAMP AT THE BALL GLACIER.

THE weather in the autumn at Mount Cook is delightfully pleasant, and up till the day of our arrival we had no fault to find with it. Next morning, however, we awoke to find a falling glass and a cloudy sky. This put rather a damper on our plans, as I had intended to start off up the Tasman Glacier with the tents and some provisions, taking with me Annan, a young shepherd whom I had engaged to help with the swagging. As it was, we deemed it prudent to confine ourselves to short walks in the vicinity of the Hermitage, so we climbed to View Point, overlooking the Mueller Glacier, and watched the storm-clouds breaking over the summit of Mount Cook. High up in the heavens the clouds were being driven before the south-west wind, while a lower current from the north-west was wreathing the rain-clouds around the highest peaks of Aorangi and Mount Sefton. It was a battle between the two winds; but at last the north-wester triumphed. We obtained a momentary glimpse of the highest peaks of Mount Cook, and then the mists wreathed themselves about the mountain, and hid it from view for the rest of the day. The north-west wind struck us with great force, and, as we peered over the edge of the hill down on the rock-covered surface of the Mueller Glacier, we could scarce bear up against it. The temperature quickly fell to 52°, then the rain came on, and with it my hopes for the Hochstetter Dome climb fell to zero, for the new snow on the mountain-tops would make it rather dangerous work when there were only the two of us. To make matters worse, Annan's horse, on which we had intended to pack the stores and tents across the Hooker River, if possible, had beat a speedy retreat to Birch Hill Station. There was nothing for it but to remain in enforced idleness for the day. During the night it rained heavily; but this had the effect of quietening the north-wester, and next morning the weather looked more promising, so we decided to make a start. Annan, after a long tramp, succeeded in catching his horse; and, getting another pack-horse from Mr. Huddleston, we fixed up the tents, ice-axes, sleeping-bags, and provisions, and started on our expedition. We were a little anxious about the Hooker; but, judging it was low enough, we decided to try and get the horses over, as this would save a good deal of swagging, for, once safely across the river with the horses, we should have no difficulty in taking them right up to the foot of the Tasman moraine. We reached the Hooker in due course, and Annan, getting on his own horse and leading the pack-horse, entered the stream. It was an anxious moment as he got into mid-stream, where the current was swiftest, and the boulders of rather unstable equilibrium; but he got safely across. I got into the cage that dangles from the wire rope, and, not without difficulty, pulled myself over to the other side. A tramp of an hour across the shingle-flats of the Tasman brought us to a dilapidated shepherd's hut, where we boiled the billy and had some tea. We spent little time there, however, but proceeded to the edge of the moraine, about a mile further on. Here we undid the packs and tethered the pack-horse with the alpine rope, letting Annan's horse loose, to return to Birch Hill at her own sweet will.

The hard work of the expedition was now about to commence in real earnest. The packs to be transferred from the pack-horse's back to our own looked a goodly pile: 25lb. of biscuits, 12lb. of tinned meats, two loaves weighing 14lb., 4lb. of oatmeal, 3lb. of butter, 4lb. of jam, one shoulder of mutton, 2lb. of onions, 2lb. of tea, 1lb. of cocoa, 1lb. of coffee, 4lb. of sugar, 1lb. of salt, four tins of sardines, and a few pots of Liebig constituted the bulk of our provisions. In addition to this, there were the two tents, three sleeping-bags, one opossum rug, one large sheet of oiled calico, two ice-axes, one alpenstock, 100ft. of alpine rope, billies, spirit-lamp, lantern, aneroid and thermometers, and several other smaller articles, which all went to make up weight. Before us was the long moraine of the great Tasman Glacier, and over this, for a distance of seven or eight miles, all these articles had to be carried on our backs. It was no joke. I knew that the undertaking was rather a difficult one. I had no idea, however, how difficult it would be. Annan selected from among the articles a swag weighing about 50lb. I made up one that would be probably 10lb. lighter, and, covering up the remainder with the oilcloth sheet, at 3 o'clock we started off, hoping to reach Green's fifth camp that evening. Profiting by the experience of the Rev. Mr. Green and Dr. von Lendenfeldt, we made no attempt to get on to the clear ice in the middle of the glacier, but kept to the rocks on the side of the lateral moraine that runs for miles parallel with the great southern arête of Mount Cook. There was fair walking for some little distance, till we passed the group of tarns of a peculiar greenish colour at the end of the moraine. Then the rocks got rougher, and piled in wilder confusion as we proceeded. It is difficult to give any one who has not been on a glacier an idea of the roughness of this moraine, but I cannot improve on the description given by the Rev. Mr. Green in his book on "The High Alps of New Zealand." Of the difficulties of this same route he writes: "The lateral moraine, standing up like some great battlement shattered in the war of the Titans, was composed of huge cubes of sandstone and jagged slabs of slate, some


From sketch by F. Huddleston

From Braemar, looking up Tasman and Hooker Valleys.

M 70 U

over 20ft. a side, and ready at any moment to topple over and crush our limbs." We found scrambling over these rocks very hard work on such a hot afternoon, but made good progress, and soon found ourselves at the Blue Lake, where Mr. Green weathered out a very severe storm on his first trip up the Tasman. Just before reaching the lake there was a bad bit of travelling through thick scrub, which Annan had not looked forward to with any great degree of pleasure; but on reaching the spot we found that a great slip had come down from the moraine, exposing the clear ice of the glacier, and completely covering the scrub for a distance of about 100 yards with morainic accumulation. The ice was quite near, from which it would appear that there is more *live* moraine than Dr. von Lendenfeldt imagined. This slip had occurred since February, when Annan was up with Mr. Mannering's party; so that we were really the first to see the clear ice on the lower part of the lateral moraine. The slip gave us a little fairly good walking, but we had some difficulty in getting through the last bit of scrub at the Blue Lake. Beyond this we had to cross the *débris* of a great talus fan that came down from the mountain side, and then we came to a piece of level ground, between the moraine and the mountain side, which afforded the only real bit of easy walking in the whole journey. This flat—about a quarter of a mile long—was covered with large tussocks, spear grass, veronicas, and a wealth of celmesias. Ahead the moraine continued its course, in the words of Mr. Green, "looking like some great railway embankment in the symmetry of its outline." At this point we came across a number of keas, who regarded us with looks of wondering curiosity. They proved most entertaining birds, but, as there was a probability of our being hard up for provisions before our return, I could not resist the temptation of knocking over a couple of them with my saloon pistol. It may be mentioned here as rather a strange fact that the keas in the Tasman Valley have not yet learned to kill the sheep, probably because of the abundance of natural food that exists there. There was another very bad bit of rock scrambling farther on; but we were getting used to this kind of thing now, and, as we kept up a steady pace without halting, we managed to get to the camping-place at the foot of the Ball Glacier just as the sun was setting.

We lost no time in pitching our tent, using the identical tent-poles that Mr. Green had brought up years before; while, instead of a ridge-pole, we had Dr. von Lendenfeldt's survey-chain. As we sat enjoying our tea in the waning light we congratulated ourselves on having made such good progress. It had taken Mr. Green five days before he finally pitched his tent here, and Dr. von Lendenfeldt had been six days in coming up: yet the distance is only eight miles! Both these, it must be remembered, had a good deal of swagging to do; but they had good men helping them; so the roughness of the ground over which they had to travel can be pretty well imagined. But we had come from the Hermitage, a distance of fourteen or fifteen miles, and had carried heavy swags over the moraine, making the entire journey in one day, so that we considered we had done fairly well. Though it had been a broiling hot day it got very cold towards nightfall, and as we crept into our sleeping-bags the thermometer had fallen to 30°. Later it registered 3° below freezing-point, and, as we had not had time to get dry bedding, we spent rather a cold night. I was exceedingly miserable, as the sleeping-bag which I had got made in Dunedin was not a particularly comfortable one. Towards morning it got still colder, and even Annan, who was used to roughing it in these wilds, admitted that it was "a bit cool." Next morning was again fine, and, after breakfast, we started off down the glacier. Annan returned with another swag of provisions, and I, taking the pack-horse with me, turned my face towards the Hermitage. I did not exactly relish the idea of crossing the Hooker on horseback, so, on reaching the river, I drove the horse in, and spent a few anxious moments as I saw her once tottering in mid-stream. She reached the other side in safety however, and I pulled myself across in the cage, arriving at the Hermitage about 3 o'clock in the afternoon, a little tired with the two days' exertions. We—that is, my wife and I—had intended to start for the Fifth Camp that afternoon, but the weather looked threatening, and, as it was snowing on the mountain-tops, we decided to delay our departure.

On the morning of Sunday, the 1st April, we said good-by to our friends at the Hermitage, most of whom thought they

Rev. W. S. Green's Fifth Camp,
on his ascent of Mt. Cook.

should see us back again before nightfall. I must confess I had some misgivings on the point myself, but we plodded on over the grass-flats, and in about an hour's time we found ourselves at the wire cage on the Hooker River. It is a fearful river this Hooker—roaring over its loose boulders and dashing itself into foam, savagely, as if annoyed that it has not yet had an opportunity of drowning some one. The cage, however, is slung high above the torrent, on a long wire-rope, on which it runs on pulleys, and, safely seated in it, you pull yourself over by another rope that also spans the stream. It is no easy matter for a nervous person to keep a cool head when dangling in a narrow cage over that fearful river. Having no nerves to speak of I felt quite at my ease, though it was a terrible pull, and my hands were full of splinters with hauling on the stout manilla rope. However, we got over at last, and I returned and fetched the swag across with me. Just as I was approaching the other side again two young fellows from the Hermitage made their appearance, and evidently wanted to get across. We, however, much preferred that they should stay where they were, as we knew that when they returned they would take the cage with them and leave us in a fix on the Tasman side of the river. Accordingly, while the two strangers were gazing at us from the opposite bank, we tied the cage securely on our side, and, scrambling down to the river-bed, resumed our journey. Before we had gone a hundred yards we were horrified to see one of the young fellows, in the most daring manner, commencing to scramble across on the wire-rope to get the cage. It was a bold thing to do, but I must say we were more concerned about our own getting back.

We had now crossed the Rubicon, and, with the impassable glaciers of Mount Cook before us, and the foaming Hooker behind us, we were completely cut off from civilisation. On arrival at the hut we were delighted to find Annan waiting for us, and were greatly refreshed with the tea he had prepared. The hut was rather an uninviting place, being dirty, and having no door or window, in addition to which it was inhabited by rats. We held a short council of war, and, as it was early in the day, and the walk up the Tasman moraine on the morrow was rather a big undertaking for one day, we decided not to stay at the hut, but to proceed as far as we could, and sleep out in one of the hollows between the glacier and the mountain. Accordingly we started off for a point two miles distant, at the edge of the glacier, where Annan and I had left part of our stores on the way up. Having reached this spot and adjusted our swags, we were soon on the march, scrambling over the boulders of the moraine. We made but slow progress, both Annan and myself having heavy swags, while my wife was quite unused to the acrobatic feats necessary to the keeping of one's balance in the difficult situations into which we sometimes got. We had a particularly lively time of it in the scrub at the Blue Lake; and my wife's jacket, which was tied to my swag, was torn off and lost among the bushes.

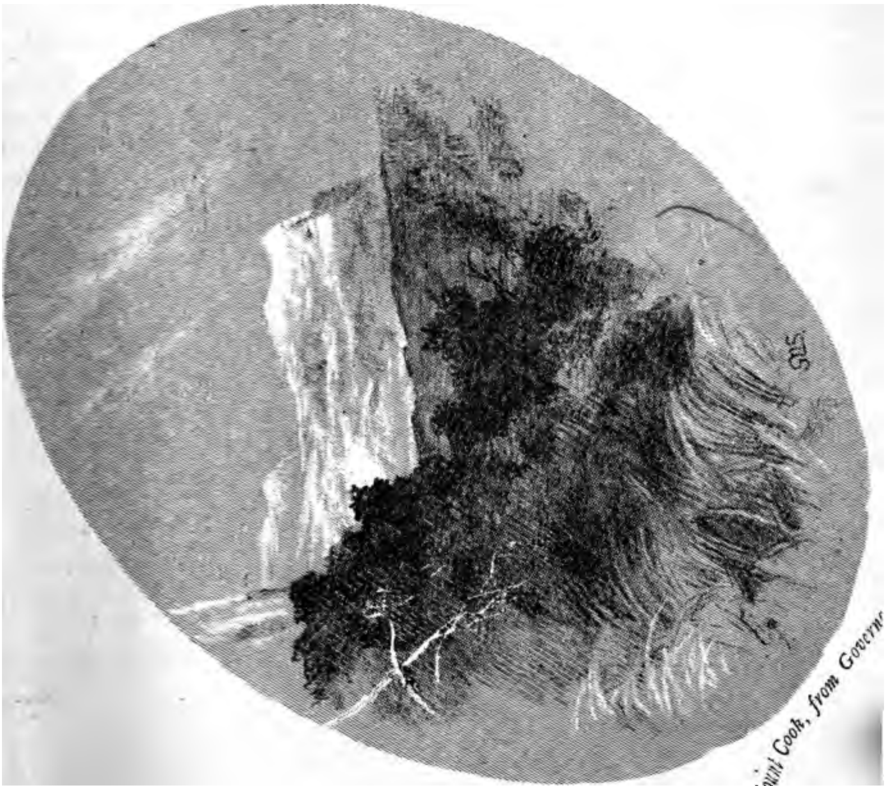
It was a sweltering hot day, but we toiled on, and, towards evening, we reached the Celmesia Flat, where Mr. Green had pitched his third camp. My wife was by this time very tired, and so, while I gathered some sticks and made the tea, she sat on a rock wrapped in the 'possum rug. Annan decided to go on to the camp and come down again to have breakfast with us early next morning. We were now close to the ice, and after tea, as it began to get very cold, I set about me to look for a good spot to make our bivouac. A hundred yards farther on some scrubby totara bushes and a stunted alpine pine grew close in to the glacier, and under the latter, after a hurried inspection, we decided to make our bed. The pine branches would be some protection against the wind should it come on to blow, and, in the event of rain, they would also keep us fairly dry. Making a rough bed of pine branches, celmesia leaves, and tussock grass we pulled the 'possum rug over us and made ourselves comfortable for the night. It was a strange sensation to be lying there in the midst of those vast solitudes. We thought of the glorious panorama of mountains that had been unfolding itself before our gaze all that day, and then our thoughts winged their way farther afield, and we wondered what our friends were thinking of. It was Sunday evening—not yet half-past 6 o'clock. The church-bells would be ringing. My wife dozed, and woke up with their music in her ears; but it was only the call of a kea far up the mountain side. Over the cold, white snows on the shoulder of Mount Cook one solitary cloud hung, fringed with the gold of the setting sun. Later the moon shone down on us through the clear frosty air with a brilliancy that I had only seen once before, on Mount Earnslaw, and lower down, in the deep dark blue of the horizon, the stars scintillated like diamonds, one bright star just seeming to rest on the point of a high peak to the westward. A rock avalanche rattled down the side of the glacier. From across the narrow flat came the weird cry of the mountain parrot; and a weka that had crept close to our heads under the branches startled us with a loud scream. Then again all was silent—silent as the tomb. Presently two visitors came to us. We had not expected visitors in these wilds; but here they were—two tiny wrens—absurd little things, with hardly the vestige of tails—who perched on the branches just over our heads, so close that we could have ruffled their feathers with our breath. They hopped about from twig to twig, speaking to us in their soft low bird voices; and, at last, having studied us from every point of the compass, they decided to give us up, and went off to roost in a totara bush. At last we also went to sleep, and, making due allowance for the hardness of our couch, and the strange surroundings, we managed to get a fairly good night's rest. When we awoke in the morning the frost lay white on the bushes around us, save within a radius of a foot or two, where the heat from our bodies had melted it towards morning. The temperature had fallen to 26° Fahrenheit, or 6° below freezing-point. On the way up I took down a reading of 80° in partial shade, so that there was thus a drop of no less than 54° in a few hours. These readings were confirmed by Annan's readings of another thermometer, which I had left at the upper camp.

I was astir before sunrise, and on going back to the Blue Lake for water to boil the billy, the garrulous paradise ducks gave me a vituperative reception, while the solitary mountain duck quacked a milder remonstrance. A shot from my pistol, however, made them think discretion the better part of valour, and, while the paradise ducks took wing, the grey duck scuttled off down stream in a great hurry. After a short search I found my wife's jacket frozen hard to the bushes, and, filling my billy, I returned to the flat. On my way up I gave a jödel that was answered by Annan far up the moraine, and in a few minutes he had rejoined us. We breakfasted together, and shortly after

9.30 we were once more on the march. All the way up the valley we had been getting glorious glimpses of some of the grander peaks of the Mount Cook chain. Elie de Beaumont and Mount Green (a pretty snow-white conical peak) looked beautiful and grand with their snowy summits towering up above the dull grey line of the great moraine; while the double peak of De la Bêche, with its domes of spotless snow, was ever before us—gleaming white in the sunshine of morning, tinted with the rose of evening, or looming up coldly in the mystic moonlight —beautiful in outline, majestic in form. The moraine itself was very interesting. "It is," says Dr. von Lendenfeldt, "larger than the moraines are in the European Alps, the cause being the slower action of the New Zealand glaciers, and the peculiarity of the rocks which surround them. There are very few places to be found where the rocks are so jointed as they are here. They are split along the different joints into polyhedric masses by freezing water; they fall on the glacier and are carried down the valley. *Ceteris paribus*, the slower the glacier moves the more moraine will accumulate. For miles no part of the glacier is visible through the moraine." The glacier does not block up the whole valley, no doubt because the heat from the hill-sides melts the ice quicker than it can be replaced by the flow of the glacier. The Malte Brun Range, on the opposite side of the valley, has some splendid rock peaks, Malte Brun itself, at which Mr. Green and his guides often cast longing glances, having the top of a Matterhorn. The glaciers on our side of the range were small, and of what may be termed the "hanging variety;" this being occasioned, no doubt, partly by the steepness of the mountain side, and partly by the greater amount of sun which this side of the mountain gets. On the other side of the Malte Brun Range, in the great valley lying between it and the Liebig Range, was the Murchison Glacier, second in size only to the Tasman.

On our left we passed one or two goodly-sized waterfalls, and, nearing a spot known as the Cove, we came across a small iron stove—a relic of the Lendenfeldt expedition, abandoned early in the journey as being no doubt a luxury too heavy to be carried over this rough ground. We had a good rest at the Cove, and whiled away half an hour with a shooting match, in which

"*Mount Sefton, from Governor's Camp.*"



"*Mount Cook, from Governo*

my wife proved herself a good markswoman. A little further on we had lunch—bread and sardines, with a pannikin of tea, again being the bill of fare. After this, there was some difficult scrambling over great rocks, many of which were so loose that we dare not put our weight on them for more than a second. We were, however, much refreshed after our long spell at the Cove and the subsequent luncheon, so tramped bravely on, and the camp was hailed with a cheer at half-past 3 o'clock.

While I pitched the second tent with the alpine rope, Annan and my wife saw about the tea, the latter making a stew out of mutton and onions. This stew was the most delightful that I had ever tasted, and just at that moment I would not have exchanged it for the rarest of delectable dishes. Judging from the rapidity with which it disappeared the others held somewhat similar opinions regarding it. Before tea I ascended the moraine, and made a sketch of Mount Cook, which towered up behind our camp, with its ice-seamed sides glittering in the sunlight, like a wall of frosted silver, through which at intervals the black rocks broke, making the white ice more beautiful by contrast. It was a glorious evening, and everything promised well for our climb on the morrow. Returning to camp we discussed the prospect of ascending the Hochstetter Dome. This would involve a walk of about ten miles over the clear ice of the glacier, and some pretty stiff work on ice with crevasses near De la Bêche, and more crevasses and an occasional bergschrund near the summit. We made no doubt, however, about being able to get up, and laid our plans so as to sleep at De la Bêche the next night, and take twelve or thirteen hours of the following day for the real hard work of the climb and descent. Towards evening it again got very cold, and neither Annan nor I half relished the idea of sleeping on the bare rocks at De la Bêche on the morrow. We discussed the probability of being able to carry up a quantity of firewood in order that we might have a hot supper, but on second thoughts we came to the conclusion that our sleeping-bags and ice-axes, with the rope, and three days' provisions, would be quite a sufficient load for us. We might have taken the spirit-lamp, but unfortunately Annan had left the methylated spirits on a rock half-way down the glacier. However, we made all our arrangements, and, just as it was getting dark we turned in for the night. As Annan got into his sleeping-bag he remarked that it would be a case of whistling and dancing turn about at De la Bêche in order to keep ourselves from freezing. He said he knew nine or ten steps of the Highland fling and he would see how many he could teach me before daylight. The temperature was low enough where we were. Annan informed us that he had put on two shirts, two pairs of breeches, and two pairs of stockings, and if he was not warm it would not be his fault. My wife and I slept with our clothes on as well as our tennis-shoes; and, having the 'possum rug and my oilskin over us, we kept quite warm. During the night we could hear the rock avalanches rattling down the face of the glacier just opposite our tent—a couple of hundred yards distant—but King Frost held the glaciers themselves in his cold grip, and there were no avalanches after nightfall. Being too tired to pay much attention to the screaming of the keas we soon fell asleep.

CHAPTER IV.

ON THE GREAT TASMAN GLACIER.

GLACIAL PHENOMENA—BAD WEATHER—THE HOCHSTETTER EXPEDITION ABANDONED—GRANDEUR OF THE SCENERY—A BAD NIGHT IN CAMP—ON THE GLACIER AGAIN—EDELWEISS—RETURN TO THE HERMITAGE.

ON rising next morning we found that the barometer had fallen considerably during the night. While we were having breakfast the sky grew grey, and a black cloud came sailing from the north-west, wreathing itself ominously around the higher snows of Haidinger. However, I was loth to give up the expedition to the Hochstetter Dome, so I said nothing about the falling barometer, and we packed up provisions for three days in the sleeping-bags, and, taking also the ice-axes and the alpine rope,

Ice Cliffs on the Tasman Glacier.

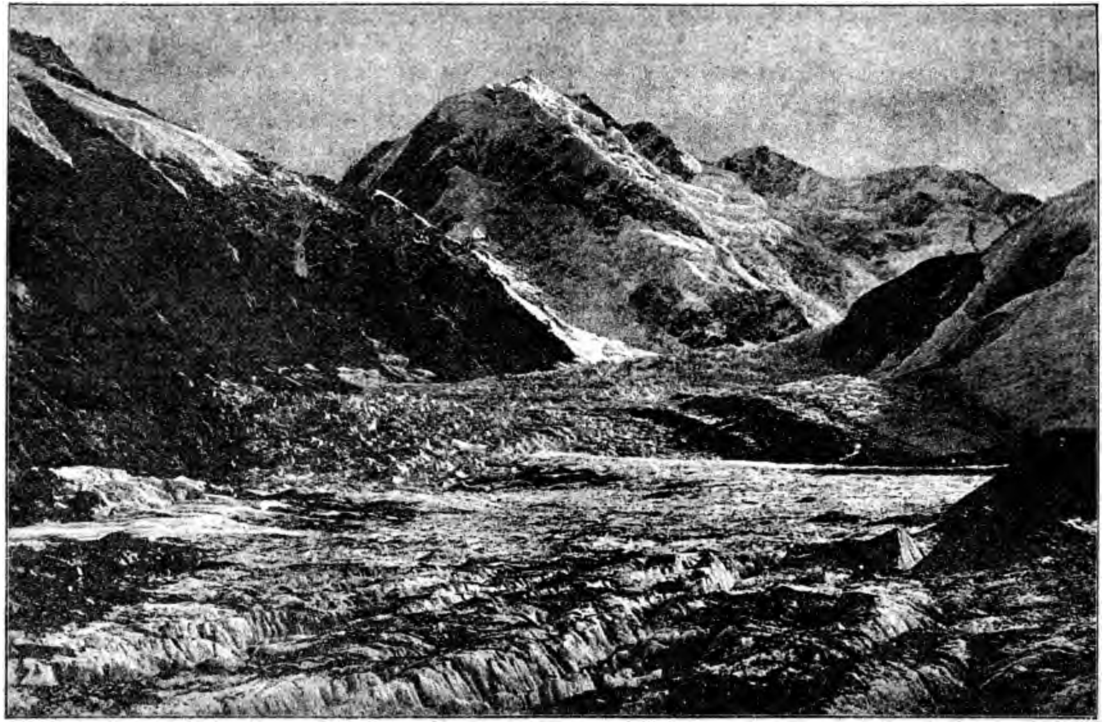
just before 10 o'clock we started out from the camp.. A walk of a few minutes took us on to the broken ice of the Ball Glacier, and then, gaining the clear ice of the Hochstetter, we struck across it and up the Tasman.

Just at this point, where the Ball and Hochstetter Glaciers join the Tasman, the glacial action is most interesting. The Hochstetter Glacier is the grandest of all the sights I have ever seen in the Southern Alps. It issues forth from the great ice plateau at the foot of the precipices of Mount Cook, descending in a wonderful cascade of broken ice 4,000ft. high. It cuts into the Tasman at an angle of about 45°, and, the two glaciers flowing onward and not pressing very closely together, causes a chasm some 500ft. deep to remain between them. The bottom of this hole cannot be seen, but I should think it must reach downwards almost to the floor of the glacier. Before proceeding any great distance we find that there are two series of crevasses—one formed by the pressure of the Hochstetter Glacier, causing the ice on the western side to move faster than that portion of the glacier abutting on the Malte Brun Range, while another series is caused by the bending round of the main ice-stream in a grand sweep between Malte Brun and De la Bêche, forming long crevasses which run across the glacier on its convex side.

As we proceeded, the sun shone out brightly, and the glare from the white ice was so dazzling that we had to keep on our blue goggles to avoid snow-blindness. A little beyond the Hochstetter Ice-fall we halted to admire the view. Down the valley we could see the lower part of the Ball Glacier. Right in front lay the gleaming ice-slopes and dark precipices of Aorangi, towering up, and culminating in the tent-shaped ridge 8,000ft. above us; while down from the great ice plateau, between the south-eastern spur of Mount Cook and the Tasman Spur, the Hochstetter Ice-fall poured its beautifully-coloured cascade of broken ice, in spires and cubes and pinnacles—a wonderful sight—till it joined the Tasman, on which we now stood. Every few minutes great masses of ice were broken off with the superincumbent pressure, and went thundering down with awful roar over a precipice on the left. About half a mile farther on the Freshfield Glacier came down at right angles;

and over the bold rocky spur on which it rested appeared the ice-cap of Mount Tasman. Then came the glorious mass of the Haast Glacier, in sunshine and shadow; and beyond this again "the square-topped Mount Haidinger—10,020ft. high—robed in white glaciers, stood, as the next worthy member of this giant family." Then came Glacier Peak, and Mount Spencer, Mount Jervois, the Kron Prinz Rudolf Peak, with the great Franz Josef Glacier, above which again, farther to the right, gleamed the white snows of the Minaret Peaks, and the glaciers of De la Bêche, much broken and rent with crevasses, such as are seldom seen outside the region of polar snow. Portion of Elie de Beaumont was also visible; but the upper part of the Tasman was hidden by the splendid buttresses of the Malte Brun Range. Words could hardly describe the scene, and one felt quite moved with its grandeur. "I tried vainly," says the Rev. Mr. Green, "to recall the view in Switzerland on the great Aletsch Glacier in front of the Concordia hut, to establish some standard for comparison. Then I tried the Görner Glacier, on the way to Monte Rosa, but the present scene so completely asserted its own grandeur that we all felt compelled to confess in that instant that it surpassed anything we had ever beheld."

While we were gazing the clouds increased, and a chill wind sprang up. The higher peaks were becoming obscured in the clouds. It was evident a storm was brewing. It would have been madness to tackle the Hochstetter Dome, so we left our swags behind, and, taking only the ice-axes and the rope, made a bolt for De la Bêche, to see what we could of the upper portion of the glacier. We made good progress over hummocky ice, and at last, when opposite De la Bêche, looking up the valley, we just managed to get a glimpse of the Lendenfeldt Saddle. A fine unnamed glacier coming down from the shoulder of Mount Spencer I named after my wife, who, by her pluck and endurance, had conquered all the difficulties that lay between us and the enjoyment of this scene of alpine grandeur, the like of which I had never seen. On thinking over what we had come through during the past two days, both Annan and I came to the conclusion that she well deserved this honour, and tossing our hats in the air we gave three cheers for the new glacier. Then we took a last longing look at the glorious amphitheatre



The Empress Ice Fall.

of mountains, and, turning our faces campward, beat a hasty retreat. It was a pleasant surprise to my wife to see us back in camp that afternoon. It was well that we returned, too, for that same night it came on a terrible storm. The wind rose from the north-west, and blew with such force that we thought every moment the tents would be blown into ribbons. We strengthened them with the spare rope, and put heavy stones all round the canvas on the ground outside. Hour after hour the gale roared furiously; sleep was out of the question. High up the mountain-spur we could hear the wind howling and tearing the alpine foliage in its fury. Then it would swoop down on our tent and send the sides flapping with reports like pistol-shots. Again, it would cease for a moment, as if to catch breath, only to come swooping down on us with even greater vengeance. After what seemed a very long time, I looked at my watch and found that only two hours had gone by. The barometer still gave a very low reading, and it was evident that we were in for a bad night of it. Soon after midnight the rain came on, and the force of the wind beat it through the tent. I rigged up a hood over my wife's head with my waterproof coat and the tin in which the biscuits were. Then, tying our caps down over our ears, we coiled up in the 'possum rug and once more tried to sleep. But the wind howled and the rain beat on the tent, and sleep was out of the question. Twice during the night I had to get up, tighten the ropes, and put bigger stones on the sides of the tent to prevent it being blown clean away. For twelve hours we lay listening to the fury of the storm, and at last the dawn came. Never was I more pleased to see the first streaks of daylight. The weather improved somewhat; and, though it was a showery afternoon, we made a successful expedition across the Ball Glacier and up the Tasman, so that my wife might not go away without getting a good view of the Hochstetter Ice-falls. We struck out on a new route, and some of the glacier phenomena noticed proved extremely interesting. Just beyond the Ball Glacier a good sized surface-stream went rushing down over the clear ice of the Hochstetter, and the ice-caves and crevasses were very beautiful. Some of the latter appeared to be of great depth, as stones, which we rolled into them, took from five to six seconds to reach the bottom. In one place we walked under an ice-bridge, the vault of which was 20ft. or 30ft. above our heads.

On returning, Annan and I climbed the spur below the Ball Glacier in a search for edelweiss, and were rewarded by getting some very fine specimens. One bunch, which at first seemed out of reach, was wonderfully beautiful, and Annan risked a good deal in his endeavours to get it. He succeeded at last; but at one time, for a few seconds, he had no foot-grips, and was simply hanging on to the rocks with his hands. On returning to camp he presented it to my wife, and we succeeded in carrying it to town intact in one of the billies. We also succeeded in getting some fine celmesias and mountain-lilies, with which, and the white gentian, the whole hillside at this spot was covered. We had another wet night in camp, but the wind had gone down, and next morning the weather had cleared, so we lost no time in striking camp and commencing the retreat. The mountains, robed in newly-fallen snow, looked more beautiful than ever. We decided to go only as far as Mount Cook hut that day, but we made such good progress over the moraine that we got there early in the afternoon, and decided to continue our journey to the Hermitage. On reaching the Hooker we found that the cage had been left on the other side, and could only be pulled over part of the way. This was a sore disappointment. There was nothing for it but to retrace our steps to the Mount Cook hut, or for me to crawl along the rope and secure the cage. We chose the latter alternative, and, while my wife's hair stood on end, I crawled along the wire rope and scrambled down into the cage, which I managed to pilot across in safety. Both of us then got in and started across, but we had a fearful time of it, as the pulling-rope had got into the current, and it was only with the greatest exertion that we managed to extricate it. We were half an hour in crossing the river, and reached the Hermitage just about dusk, after what was, at all events for a woman, a wonderful journey down from Green's fifth camp.

Note.—Since the above expedition was undertaken the Government have spent large sums of money in the formation of tracks, bridges, &c., so that expeditions to the Mueller, Hooker, and Tasman Glaciers can now be made with comparative

Mt. Tasman and Hochstetter Ice-fall.

ease. Under the supervision of Mr. T. N. Brodrick, of the Government Survey Department, a detailed survey of the four large glaciers of Mount Cook has been made, and a horse-track has been formed up the side of the Tasman Glacier to Green's fifth camp, so that even ladies can now make the journey without great fatigue. A shelter-hut has also been built on the site of Green's fifth camp. The hut is 18ft. by 12ft., of iron, and lined with roofing-paper. It has two compartments, one of which is for ladies, and in each room is a large iron-lined box for storing blankets, &c. A lady can now ride to the hut, which is eight miles up the Tasman Glacier, with safety, and only those who have tramped over that terrible moraine, with a swag on their backs, before the days of tracks, will ever be able to fully appreciate the luxury of the newly-formed pathway. The Hochstetter Ice-fall, a cascade of broken ice which comes down from the shoulders of Mount Cook into the Tasman Glacier from a height of 4,000ft., and is one of the finest sights to be seen in alpine regions, is within easy distance of the hut; while further on are glaciers of splendid proportions and striking individuality. His Excellency the Earl of Onslow was one of the first tourists—excepting a few Home and New Zealand mountaineers—to visit this wonderful locality, and was greatly delighted with all he saw. Now that the hut at Green's fifth camp is an established fact, ordinary tourists will be able to proceed two or three miles up the glacier, and those who have some knowledge of Alpine climbing can traverse the vast ice-field for a distance of about eighteen miles, and make the ascent of the Hochstetter Dome, over 10,000ft. high. From this point the view is indeed a marvellous one, the ocean being visible on either side of the Island, while northward and southward there is a land-view extending over a distance of four hundred miles.

Mr. Brodrick, during his survey of the glacier, had his party, with theodolite, &c., on the top of the Hochstetter Dome. They spent a night at Lendenfeldt's camp on the rocks at the foot of Malte Brun. From there they gained the Lendenfeldt Saddle in three hours, and another three and a half hours saw them on the summit of the Dome. As the day was cold they had to cut about two hundred and fifty steps in the ice in making the ascent, but no great difficulty was experienced. The journey will no doubt become a popular one with alpine men.

CHAPTER V.

A CLIMB ON MOUNT SEALEY, AND ASCENT OF MOUNT MABEL.

Over the Rocks and the Snow-slopes—An Avalanche from Mount Sefton—The Metelille Glacier—A Wonderful Panorama—Glissading—First Ascent of Mount Mabel—Alpine Flora.

One morning after our return from the Tasman Glacier I found myself basking in the warm sunshine in front of the Hermitage, dividing my attention for the most part between a book and a cigar, and occasionally gazing up at the ice-cap of Mount Sefton, from which every now and then great masses broke away and came tumbling over the precipices with thundering roar. I was joined by Mr. Huddleston. We chatted for a while about things in general—among them, the prospects of the district in connection with the tourist traffic, and the feasibility of establishing an alpine club in New Zealand—after which the conversation turned on glaciers. On my expressing a desire to learn something more of the Mueller Glacier system, Mr. Huddleston suggested I should satisfy myself by a climb on the Sealey Range, and, if time permitted, by climbing Mount Sealey, an expedition that had not hitherto been attempted. Accordingly next morning, taking some luncheon and an alpenstock, I started off on my expedition. Mona, Mr. Huddleston's little fox-terrier, always eager for a mountain scramble, came with me.

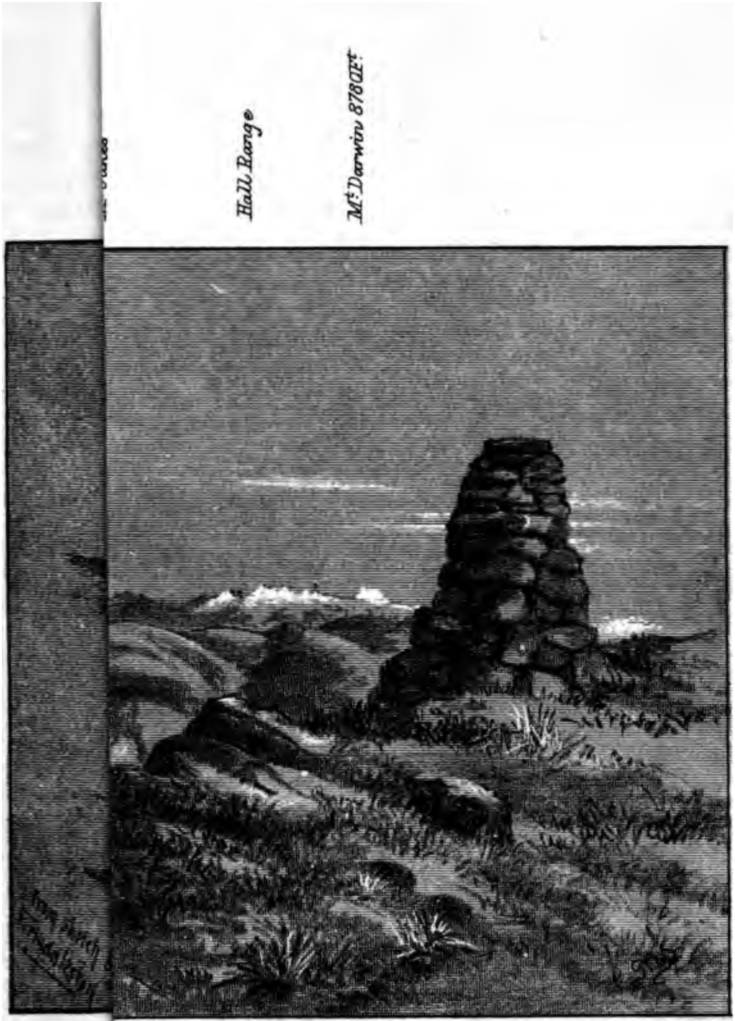
It was a glorious morning, and the glaciers at the head of the Hooker were gleaming in the sunlight, while the long southern arête of Mount Cook, right up to the summit, was in shadow, and there was one patch of glistening white on the top of St. David's Dome. Mount Sefton, with the broken ice of its hanging

A quick way Home over the Sealey Range

glaciers, was resplendent in the full sunshine; and every now and then a great avalanche thundered down from the highest slopes. The mocking birds were singing in chorus to the tuis' liquid song, and the beat of the hammers on the roof of the new buildings at the Hermitage was borne up through the still air. Mona, scorning the amenities of the locality, spent a good half-hour in seeking after the destruction of a weka that had chanced across her path, and, being unsuccessful in the hunt, once more condescended to resume the climb. We toiled on in the broiling sun together, and after an hour and a half of pretty stiff climbing succeeded in reaching an elevation of about 5,000ft. Halting for a spell at a little lakelet on the shoulder of the mountain, I chanced to look up, and was surprised to see some one on the rocks above me. He turned out to be a plumber-lad who was engaged on the works at the Hermitage, and, as I depicted the projected expedition in glowing colours, and offered to share my luncheon with him, he was easily persuaded to accompany me. We were now a merry party of three —myself, the plumber-lad, and the dog. We soon gained the summit of the range, about 6,000ft.; and then, consulting my map, I found that Mount Sealey was miles away, at the other end of the glacier, near the head of the Mueller, and just overlooking the Metelille Glacier. However, we decided to go on and see what the route was like. We found that by keeping along the top of the range we would make but slow progress, as there were several peaks where the rocks were rather steep, so we cried a halt and scanned the side of the mountain ahead through the binocular. The best way seemed to be to descend about 1,000ft. to the Mueller Glacier, and then to ascend again over an easy slope to an unnamed glacier that crowned the top of the range just below the final peak of Mount Sealey. Having decided upon this course, we lost no time in setting off, and clambered down over some loose rocks, which brought us on to a short snow-slope. Though the ice was rather slippery, we managed to cross without the aid of ice-axes. There was some easy rock work following this, and then another slippery snow-slope, in crossing which great caution had to be exercised, as an involutary glissade would have landed us on some rocks 200ft. or 300ft. below. Using my alpenstock against the face I went straight across the slope; but my companion, who was evidently rather afraid of the snow, kept lower down, preferring the safer footing which the rocks afforded. The last rocks leading up to the glacier on the top of the range were of a peculiar reddish colour, and worn somewhat smooth, no doubt by the action of avalanches, which would be rather frequent there in the spring time, when the snows were melting. We were sorely tried with thirst, as it was a blazing hot day, and there was no water, so we resorted to the expedient of spreading some snow on the warm rocks and allowing the water, as it trickled down, to fall into a hollow below. In this way we got a little water, which proved very acceptable as we sat discussing our luncheon. We spent only a quarter of an hour here, as time was valuable, and, keeping a direct course upwards, we now soon found ourselves on the edge of the glacier which we had seen lower down, and which we now observed stretched up toward Mount Sealey for a distance of about three-quarters of a mile. There was no difficulty in crossing this glacier, as it was nearly level in places, and the few crevasses were easily avoided. In one place a surface-stream, which ran for some distance over the ice and then disappeared into a crevasse, was hailed with welcome, and we stopped to quench our thirst with its icy cold waters. While we waited a splendid avalanche shot over the Mount Sefton precipice nearest us, and went thundering down with awful roar, not stopping till it had reached the edge of the Mueller Glacier, thousands of feet below. As we proceeded the glacier rose with a fine sweep, curving over on to a small ice plateau. We proceeded quickly, stopping only now and then for a moment to admire the glorious panorama of mountain scenery which increased in grandeur and extent the farther we proceeded. At length we halted at the foot of the snow-slope, and found that it blocked our progress, as it was too steep to be climbed without steps, and, not knowing that there would be any ice-work to do, I had unfortunately left my axe behind. Looking to the right we observed a way out of the difficulty. A narrow rock arête which tapered off towards the Mueller at its lower end ran right up to what appeared to be the final peak, and we made direct for this. It was a steep pull at first, but the rocks afforded good hand-grips,

The Stocking Glacier and Mt. Sefton.

and it was safe and easy climbing. Then we proceeded along the top of the arête, which was so sharp in one or two places that we almost crawled along on hands and knees, and had to use the utmost caution. On our left the rocks sloped away to the unnamed glacier over which we had come. On our right we looked sheer down on to the Metelille Glacier, hundreds of feet below. Some loose rocks which I dislodged with my foot went clattering headlong down the cliff, and stopped not in their mad career till they fell in splinters on the ice below. Onward we toiled, and ceased not until half-past 4 o'clock in the evening, when we halted upon a sharp peak, from which we beheld the most wonderful view that in all my alpine wanderings I had ever seen. And to think that we were the first to make that journey! To think that underneath our feet was ground where never man had trod before! It was a glorious afternoon. From east to west, from north to south, we scanned the sky, and not a cloud was there—nothing but the vast illimitable blue. Below us the Metelille Glacier curved gently down for some distance, and then poured its ice in a broken mass into the Mueller. Far down, 4,000ft. below, winding through the valley, we could see the clear ice of the Mueller, broken up here and there into innumerable crevasses. From the source of the Mueller Glacier the eye swept round the peaks and glaciers of the Moorhouse Range to Mount Sefton, rearing its ice-seamed sides over 10,000ft. in air. Then the fine peak of Mount Stokes, and the great St. David's Dome, with its snows glistening in the sunlight, came into view; and down from their very feet flowed the Hooker Glacier, with the tributary glaciers from the great southern arête of Mount Cook, pouring their ice in continuous never-ending streams into it. Over this long rocky ridge appeared the bold form of Haidinger, with his glaciers robed in shadow, save for a little patch of gleaming white on the western slope. Then the Kron Prinz Rudolf Peak, and the familiar form of De la Bêche, with the Minaret Peaks uplifting their two cones of spotless white high above all the glaciers. Still further afield was the beautiful Elie de Beaumont, flanking the north-eastern side of the Tasman Valley, and just beyond it Frau Von Lendenfeldt Glacier, the Lendenfeldt Saddle, and the white mass of the Hochstetter Dome, terminating the valley. Down from this came the great ice-stream of the Tasman, plainly visible for eighteen miles, down past Elie de Beaumont, curving round between De la Bêche and Malte Brun with a majestic sweep; then, flowing in a straighter line past the Kron Prinz Rudolf Peak, and Mounts Jervois, and Spencer, and Haidinger, and Haast, receiving tribute from glacier after glacier, till it stopped far down the valley, melting slowly, and issuing forth in another form—the Tasman River. Flanking it to the eastward was the Malte Brun Range, steep and rocky; and beyond that, in the hollow between it and the Liebig Range, in dim shadow, lay the Great Murchison Glacier. What a glorious panorama of mountain scenery it was! Dozens of peaks, from 8,000ft. to 12,000ft. high, and between forty and fifty glaciers, were in sight at one time; while right in the midst of it all rose the buttresses of Aorangi, pile on pile, till where the final peak—its snowy crest 12,349ft. high—glinted in the sun. Miles and miles away, in the direction of Timaru, a grey haze hung over the sea; and midway, in the tussocky plains of the Mackenzie Country, lay the beautiful Lake Tekapo, like some huge turquoise, glorious in a golden setting. It was grand to sit up there, on the mountain-top, as the sun sank seaward. One began to realise that there were sermons in stones. I had preached to me that day a sermon that I shall never forget, and in a grander cathedral than ever mortal dreamt of. No marble floor was ever so white as the glacier in sunlight at our feet; no cathedral dome of such immensity as the blue sky above; while yonder, receding back, one grander than the other, towering up towards the blue dome, were the massive, rocky columns of the mountain-peaks. Musing on all this, I felt myself grow small—and smaller still when I began to think of prehistoric times, when greater glaciers clothed those dull, far away plains, and higher peaks "towered vast to heaven." How long since the great ice sea had poured its vast moraine beyond the lakes? How long since the giant moa had walked the oceanward plains? And how long would it all continue? The mills of the gods ground not slowly here. The mountains were crumbling before our eyes as the rock avalanches rattled down their bare sides. Lower, the beautiful lilies clothed their nakedness, with coprosmas, and veronicas, and


Hall Range
Mt. Darwin 8780 Ft.

senecios in great variety. Higher up the silvery-leaved celmisia climbed, and higher still, in clefts among the rocks, the rarer edelweiss found a home, to blossom in the summer time, when the snows were once again in cloudland. But we were above all these, in the midst of a wilderness of rock, with black mountains crowned with gleaming ice-caps rising into the dark blue depths of heaven—almost too fair, it seemed, for this world. It was sad to think how little we knew of it all; sad, also, to think that only two men in all the world had seen this glorious panorama—myself and the plumber-boy from the Hermitage; sad, too, to live in it only for such brief time, and to have to leave it all behind. How long it had been, and how long it was to be, we could not tell. Suns would rise and set, and moons would wax and wane, bathing yonder distant lake with a silvery light for ages yet to come; and in a few brief years the bones of us poor mortals would be mouldering in the dust that had been carried down from these self-same mountain-tops æons before. And yet there was something elevating and ennobling in it all. Perched up here on our high crag, far away from the hum of cities, we could learn great lessons. "The earth had ceased for us to be a weltering chaos. We walked in the great hall of life, looking up and around reverentially. Nothing was despicable—all was meaning-full; nothing was small, but as a part of a whole, whose beginning and end we knew not." It would be pleasant to stay up here longer—pleasant to dream on in the evening, "when the clouds lift themselves like gates and the red lights shine through them." We had come to such a place as Carlyle's Teufelsdröckh after the final catastrophe with the fair girl Blumine. Yonder were the "stony hollows, along straight passes, traversed by torrents, overhung by high walls of rock." There, were "broken shaggy chasms and huge fragments." "Valleys in complex branchings are suddenly or slowly arranging their descent towards every quarter of the sky. The mountain-ranges are beneath our feet, and folded together; only the loftier summits look down here and there on a second plain: lakes also lie clear and earnest in their solitude. No trace of man now visible—unless, indeed, it were he who fashioned that little visible link of highway here, as would seem, scaling the inaccessible, to unite province with province. But sunwards, lo, you! how it towers sheer up a world of mountains, the diadem of the mountain region! A hundred and a hundred savage peaks in the last light of day, all glowing of gold and amethyst, like giant spirits of the wilderness—there in their silence, in their solitude, even as on the night when Noah's deluge first dried! Beautiful—nay, solemn—is the sudden aspect to the wanderer. We gaze over those stupendous masses with wonder, almost with longing desire. Never till this hour have we known Nature—that she is our mother, and divine. And, as the ruddy glow fades into clearness in the sky, and the sun has now departed, a murmur of eternity and immensity, of death and of life, steals through the soul; and we feel as if death and life are one, as if the earth is not dead, as if the spirit of the earth has its throne in that splendour, and our own spirit is therewith holding communion."

Dreaming thuswise, and thinking how near the great writer of "Sartor Resartus" had got to nature, I, too, like poor Teufelsdröckh, found myself suddenly startled. True, there was no Blumine in gay barouche and four. No, only an avalanche, crashing down from Sefton's steep slopes into the shadowy abyss 1,000ft. below. There was a loud roar as the great mass broke away from the edge of the glacier, high up near the final peak, then a long loud rumble like thunder, which gradually died away as the ice-dust leaped in air, and the great seething mass of ice and snow swept onward, like some huge breaker, down the rocky ice-seamed sides of the mountain. It was time to retreat, so we took a last look and turned our faces homeward. We could not climb the steep ice-slope without our axes, but we could easily get down it; so, after telling my companion how to act, we crossed round the end of an ugly-looking bergschrund, and, settling ourselves in good position, made a glorious standing glissade, whizzing down some 300ft. in a few seconds. Thus, from an elevation that it had taken us an hour to gain by the rock arête, we descended without any exertion in less than a minute. We had some more glissading on the snow-slopes above the Mueller, and, though we missed our way lower down in the dark, we at last succeeded in regaining the Hermitage about an hour after nightfall. My companion was thankful for the darkness. His nether garments were badly in need of

Mt. Stokes and Upper Hooker Glacier.

The Hooker Glacier, Mt. Cook.

mending in various places, and the sole of one of his boots had been partly torn off during some difficult rock-work. He was, however, a plucky fellow, and enjoyed his trip, especially the long glissade, which was a new experience for him.

Next day, in company with Annan and Mr. B., a visitor to the Hermitage, I set out on an expedition across the Mueller and up the Hooker Glacier, intending to attempt the ascent of Mount Mabel, 6,868ft. high, on the main southern arête of Mount Cook. Annan took us across the Mueller at a great pace, 'and, as I had not quite recovered from my long climb on Mount Sealey, I felt the pace very much, and once or twice was on the point of giving in. Not liking to be beaten, however, I kept pegging away in Annan's footsteps. It was again a very warm day, and I could not resist the temptation of drinking freely of the snow-water, or of sucking a bit of ice when there was no water at hand. This, of course, made me still weaker; but we pegged away steadily, and, after having luncheon about a mile up the Hooker, we left the glacier and struck up across the lateral moraine.

Mr. B. had by this time quite enough of it, and he decided to return, while we commenced the real climb. As it was nearly all rock-work we left our ice-axes and the rope behind. The mountain-side on our left was covered with thousands of mountain-lilies, and there were glorious bunches of edelweiss growing in the clefts of the rock on every hand. Further up there were some shingle-slopes that made climbing arduous work, and at last the couloir up which we went was terminated by a great buttress of overhanging rock. There was, however, a ledge wide enough for one man to walk on at a time, and we had no difficulty in rounding the cliff. We were both rather done up by this time, and once again I was on the point of crying *peccavi*, when Annan made a discovery which put new heart into us. This was a few beautiful plants of ranunculus, which were growing right under the cliff. At first we thought we had found a new variety altogether, but subsequent investigation pointed to the fact that the plant was *Ranunculus insignis*. The discovery is, however, of some importance, as these plants had never, so far as I could ascertain, previously been seen in the vicinity of Mount Cook.

The climbing beyond this point was comparatively easy, over good rocks and an occasional patch of snow. At one place we came on a curious cleft in the rock, a chasm formed by the rock having, through some mysterious agency, been split asunder. In another twenty minutes we were on the very summit of the peak, and while I sat down and took a few notes and a hasty sketch Annan built a cairn with the loose rocks available. The view was again a grand one, but not so comprehensive as the one from Mount Sealey. We had a nearer view of the Hooker and the final peak of Mount Cook, and also a splendid view of the mountains across the Tasman. The wind, however, was too cold for us to remain long in our scant clothing in such an exposed position, and, as it was getting late in the day, we lost no time in starting on the return journey. We made good progress down the mountain and along the Hooker Glacier, but it was dusk when we reached the foot of Mount Sefton, and we had to cross the Mueller Glacier in the dark. We, however, reached the Hermitage all right, and after a good dinner and a bottle of champagne we felt equal to another tramp of ten miles or so. We preferred, however, to talk over what we had done, and soon afterwards to go to bed.

And now, in concluding these descriptions of my journeyings, let me express a hope that they will tempt many to visit the Aorangi wonderland; but let me also express a hope that my glowing descriptions may entice no one who reads them to go and break his neck on a glacier. There are many dangers and difficulties that can only be overcome with knowledge, skill, and patience. The safest-looking way is often the most dangerous. It would be easy to get your skull cracked with a block of falling ice or rock. It would be still easier to tumble into a snow-filled crevasse and smother yourself, or to come to grief by starting an avalanche on a steep snow-slope. Therefore, I would say, Do not go with inexperienced persons. As to the pleasures and benefits of alpine climbing, I am often asked if the game is worth the candle. I answer emphatically Yes. But on this point a greater than I has spoken, and he shall be heard now. Edward Whymper, prince of alpine climbers, the conqueror of the great Matterhorn, and most entertaining of descriptive writers, thus expresses his opinion: "We who go mountain-scrambling have constantly set before us the superiority of fixed purpose or perseverance to brute-force. We know that each height, each step, must be gained by patient, laborious toil, and that wishing cannot take the place of working; we know the benefits of mutual aid; that many a difficulty must be encountered and many an obstacle must be grappled with or turned, but we know that where there's a will there's a way; and we can go back to our daily occupations better fitted to fight the battle of life, and to overcome the impediments which obstruct our paths, strengthened and cheered by the recollections of past labours, and by the memories gained in other fields. We glory in the physical regeneration which is the product of our exertions; we exult over the grandeur of the scenes that are wrought before our eyes, the splendours of sunrise and sunset, and the beauties of hill, dale, lake, wood, and waterfall; but we value more highly the development of manliness, and the evolution, under combat with difficulties, of those noble qualities of human nature—courage, patience, endurance, and fortitude. Toil he must who goes a-mountaineering; but out of the toil comes strength (not merely muscular energy—more than that, an awakening of all the faculties), and from the strength arises pleasure. If I could blot out every reminiscence, or erase every memory, still I should say that my scrambles among the Alps have repaid me, for they have given me two of the best things a man can possess—health and friends. But the recollection of past pleasures cannot be effaced. Even now, as I write, they crowd up before me. First comes an endless series of pictures, magnificent in form, effect, and colour. I see the great peaks, with clouded tops, seeming to mount up for ever and ever; I hear the music of the distant herds, the peasant's jödel, and the solemn church-bells; and I scent the fragrant breath of the pines. And after these have passed away another train of thought succeeds—of those who have been upright, brave, and true; of kind hearts and bold deeds; and of courtesies received at stranger hands, trifles in themselves, but expressive of that good-will towards men which is the essence of charity. There have been joys too great to be described in words, and there have been griefs upon which I have not dared to dwell; and, even with these in mind, I say, Climb if you will, but remember that courage and strength are nought without prudence, and that a momentary negligence may destroy the happiness of a lifetime. Do nothing in haste; look well to each step; and from the beginning think of what may be the end."

CHAPTER VI.

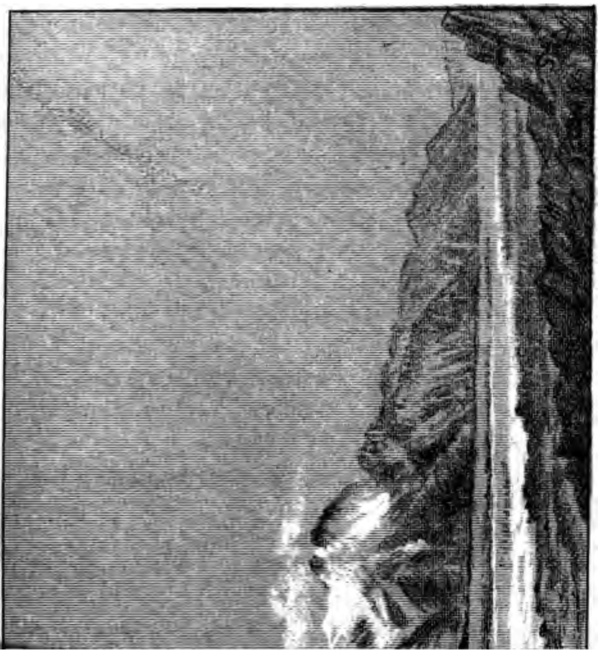
EARLY EXPLORERS AND THEIR WORK.

Dr. Haast—Mr. E. P. Sealey—Hochstetter—Rev. W. S. Green—First Ascent of Mount Cook—New Zealand Climbers.

So far as I know, there is no record to show who was the first visitor to the glaciers in the vicinity of Aorangi. The early shepherds and the freebooter Mackenzie, whose motto was

> That they should keep who have the might,
> And they should take who can,

were probably the first to see anything of the main glaciers. To the late Sir Julius von Haast, however, belongs the credit of being the first to make and chronicle any scientific exploration. The details of his valuable work are published in his book entitled "The Geology of Canterbury and Westland;" and when the rough and trackless character of the country at the time the explorations were carried out is taken into consideration, it will be admitted on all hands that he was deserving of every credit for the successful carrying-out of a most arduous and important undertaking. Dr. Haast made his first Southern Alpine expedition in 1861, when, in company with Dr. Sinclair, he explored the Rangitata and Ashburton Rivers to their sources. He proceeded up Butler and Forest Creeks—two mountain-torrents—and ascended Mount Sinclair, 7,022ft. high. From this point he describes the view as truly magnificent. "The Southern Alps appeared in all their sublime grandeur, the noble form of Mount Cook standing prominently above them all.



From west to north the whole range was visible, reaching from Mount Cook to Mount Tyndall, at the head waters of the Godley River; peak above peak, in bold majestic outlines, all glistening in snow and ice, a sight never to be forgotten." It was during this expedition that Dr. Haast had the misfortune to lose his friend and fellow-explorer Dr. Sinclair, who had entered into the spirit of the work with great enthusiasm. He was drowned while crossing the Clyde River (one of the main streams of the Rangitata River), and his body was afterwards found 300 yards below the spot where he had entered the stream. He was buried at a place called Mesopotamia, in the words of his friend, "Near the banks of the river just where it emerges from the Alps, with their perpetual snowfields glistening in the sun. Amidst veronicas, senecios, and covered with celmisias and gentians, there lies his lonely grave."

Subsequently Dr. Haast went on an expedition to Mount Torlesse, a fine massive mountain in the long range that skirts the Canterbury Plains; and in 1862, with Mr. Arthur D. Dobson, he proceeded northwards from Lake Tekapo and explored the Godley and Classen Glaciers. The Classen Glacier he found was, after a period of retreat, again advancing. Subsequently he went *viâ* Lake Pukaki, and made an extended tour to the Tasman, Murchison, Hooker, and Mueller Glaciers. It was during this expedition that Dr. Haast made what was, I suppose, the first attempt to ascend Mount Cook. A start was made on the 12th April, 1862, at daylight, up the main southern arête, but the ridge, which from the valley seemed quite smooth, was found to consist of huge rocks, broken up into very sharp prismatic fragments, lying loosely upon each other, often with deep precipices on both sides, where one false step would have cost life or limb. At an altitude of 6,500ft. Dr. Haast established his first station. At a height of 7,500ft. above the sea they came upon a chasm about 10ft. wide and 30ft. deep, which effectually barred their further progress. Like Mr. Green, Dr. Haast found this route impracticable, and had to beat a retreat. The view, however, from this point was well worth the climb, the Tasman and Murchison Glaciers, with the bold Malte Brun Range between them, and the tent-like top of Aorangi nearer at hand, being the most prominent features in the landscape.

Among those who shared the dangers and difficulties of early exploration among the Southern Alps in Dr. Haast's time may be mentioned Dr. Hector (who has contributed valuable geological information), Dr. Sinclair (the botanist); and among surveyors and civil engineers, Messrs. T. Thomson, E. Dobson, G. Dobson, A. Dobson, W. T. Doyle, H. Whitcombe, Charlton Howitt, Robert Park, Browning, J. Rochfort, James McKay, Alexander McKay, J. Burnet, and various others. Dr. Sinclair, as already stated, was drowned in the Clyde River in 1863, Mr. Howitt lost his life in Lake Brunner in 1863, and Mr. G. Dobson was murdered on the West Coast in 1866.

Among the early explorers of the Mount Cook district may also be mentioned Mr. E. P. Sealey, who in 1867 accompanied Dr. Haast in one of his expeditions, and proceeded for a considerable distance up the Hooker Glacier. Subsequently, in 1869, he made expeditions on the Mueller and Tasman Glaciers. On these occasions he took a number of excellent photographs, which were for many years the only views of Mount Cook scenery obtainable. Some of the principal photographs have been very well reproduced in Dr. Haast's book. Subsequently, Mr. W. M. Hodgkins, who may be regarded as the father of art in Otago, visited Mount Cook, and secured a number of excellent sketches of the scenery.

Coming down to more recent times we have a gentleman travelling all the way from the Old Country, with two Swiss guides—Emil Boss and Ulrich Kaufmann—for the express purpose of climbing Mount Cook. This gentleman was the Rev. Mr. Green, an enthusiastic member of the English Alpine Club; and the story of his expedition is graphically detailed in his book, "The High Alps of New Zealand." After some delay at Melbourne, through small-pox having broken out on board his steamer, Mr. Green joined Boss and Kaufmann in New Zealand, and at once set about making preparations for his trip. The journey to Mount Cook in those days was anything but an easy one, but after varied experiences his party found themselves fairly on the road. The track they followed was merely that made by bullock-wagons on their annual journey for wool from the two stations near the head of the Tasman Valley, at one of which—Mount Cook Station—they were most hospitably received by

Mr. and Mrs. Burnett. From there, at 3 o'clock, with a shepherd as pilot, the party started for the river, which, owing to the flatness of the ground, consists of a network of small and larger streams. Arrived here their troubles began. In crossing one of the larger streams their wagonette came to grief, and was swept bodily down the river, the horses and the occupants just managing to get a footing in time in shallow water. Last year, when on my first expedition to the Tasman, I learned that portion of the wreck had been seen by my man a short time previously some miles down the river. On the following day, having spent a night at Birch Hill Station, the last human habitation on the road to the glacier world, they crossed the rapid Hooker River, and by 1 a.m. camp was pitched in a patch of scrub two miles from the terminal face of the Tasman Glacier. From here the horses were sent back, with orders to return for the party on the 7th March. On the 15th Mr. Green, Kaufmann, and Boss set out up the valley, taking with them photographic apparatus. An hour's walking over grassy flats brought them to the terminal moraine, which consists of tussocky knolls about 200ft. in height, ice being nowhere seen except where the river breaks forth. On ascending this, and passing a little blue lake, a newer moraine, consisting of immense loose boulders, was reached, which made travelling most fatiguing and slow. A descent into the hollow between the mountain-side and the lateral moraine did not improve matters, for there they were entangled in formidable and almost impenetrable scrub, composed mainly of wild Irishman (*Discaria toumatou*) and sword-grass (*Aciphylla colensoi*). At last, after five hours' toil, they surmounted again the lateral moraine, and in an hour were on the white ice, enjoying the coolness of the air after toiling over the heated boulders. At 2 o'clock a point was reached from which was gained a view which Mr. Green declares is quite equal, if not superior, to anything in Switzerland. From here could be seen Mount Cook, with its attendant peaks, forming an amphitheatre round the valley, each pouring its tributary glaciers into the Tasman, while long lines of moraine, from thirty distinct ice-streams in sight, brought their tale of boulders to add to the great rampart which had given them such difficulty to surmount. Mount Cook was scanned with critical and anxious eyes by the mountaineers, but all approaches to its summit seemed most difficult, and the only decision arrived at was that the camp must be shifted in spite of all difficulties to where they were standing. On the way back to the camp part of the camera and the plates were hidden under a boulder, making so much the less to carry up on the second journey.

The next day was spent in arranging matters for the trip, and early next day a start was made, the tent being first secured against wekas. These birds, owing to their fearless inquisitiveness, were a great source of amusement. While in the first camp, the blue duck in the stream close by were so tame that, after pelting them with stones to get them close together, two or three would fall to one shot. The paradise ducks were far more wild, and the party had to resort to stratagem to secure one.

On reaching the spot where the pack had been left, at the foot of the moraine, the previous day, the baggage was rearranged, Kaufmann and Boss hitting on the plan of dividing their loads in four packages, carrying one for about an hour or so, and them scrambling back to get the other. Of course, this enabled Mr. Green to get ahead of his companions, and by dusk he had the camp pitched near the shore of a little blue lake; embosomed in dense scrub. The fine white *Ranunculus lyallii*, or Mount Cook lily, was here abundant, and its large leaves were placed by the mountaineers in their hats as a protection against the sun. Two keas, or Mount Cook parrots, were shot by Kaufmann, and made into very good soup.

That night a fearful storm arose, and after midnight, though the tent—a Whymper one—could not blow away, sleep was impossible, and when morning came there was no improvement, and no chance of lighting a fire. At 3 o'clock a retreat was made to the lower camp, where supper and sleep restored the party. All the next day was spent round the tent, exploring, and the next morning being bright and sunny, the whole landscape appeared covered with newly-fallen snow. As everything looked promising, Mr. Green started off himself for the lake camp, leaving the men to follow when all was secure. When the latter arrived Boss had shot eight ducks, which, with the parrots, gave them ample provisions.

The next day the journey was continued, and the fourth camp was pitched.

The next afternoon the fifth and last camp was reached, 3,750ft. above sea-level, Mount Cook towering 9,000ft. above it. Beyond this there was no scrub on the spurs, and hence no firewood, and so the tents were pitched as far up the glacier as possible, on a gravel-slope close to the mountain, in the angle formed by the Ball and Tasman Glaciers. Water and wood were plentiful, and the floor of the tent was made luxurious by a thick layer of brushwood. From here an excursion was made up the main glacier to reconnoitre Mount Cook. Some time was spent sounding crevasses, by means of stones, and several times a depth of 500ft. was computed. The glacier close to this last camp Mr. Green named the Ball Glacier, after one of the founders of alpine exploration, John Ball, M.R.I.A. It met the main glacier, and, unable to withstand its force, was pushed aside at an acute angle, in which the tent lay. Mr. Green noticed, by observation of its great slabs of ice, that it moved a foot per day, and at one point its pressure had been sufficient to break down the moraine, or huge rampart, which, however, was continually being built up by the glacier dropping angular stones. At night these small stone avalanches were heard frequently, and now and again the bang as of a cannon-shot testified to the birth of a new crevasse in the glacier. The blocks of the moraine were all either sandstone or slate of the newer Palæozoic formation, with occasional fragments of quartz and blocks of a kind of volcanic breccia.

Mount Cook, on inspection, presented but three possible lines of attack, and at first all these seemed so difficult that the party thought of trying an easier route from the Hooker Glacier, but as Dr. Haast had been against it, and it meant losing time, it was decided to attempt the northern arête, which seemed to join Mount Cook and Mount Tasman. The upper part of this looked easy, but the Hochstetter Fall formed the base, and was, of course, impracticable. However, a plateau was detected above its lower fall. It was finally resolved to attempt to reach, by means of a glacier, this plateau if the southern arête, the one nearest to the camp, proved inaccessible.

On the 25th February breakfast was over shortly after daylight. All was silent; glacier-streams and brooks were waiting for the awakening touch of the sunshine. Provisions were packed for three days, and rugs taken for a bivouac. For 1,000ft. up the slopes were clothed with mountain-lilies and veronicas, and the view from the top of the ridge down to the Ball Glacier and across to Mount Cook was unsurpassed. Keeping the Ball Glacier on their right, and now and then following the arête, the party reached, at 5,000ft., the line, seemingly, of perpetual snow, 3,000ft. lower than in Switzerland. Many alpine plants, some strangely familiar in aspect, such as the mountain-daisy and an alpine buttercup, were collected, and one plant of the genus Haastia, new to science, was met with as high as 6,500ft. With the exception of the yellow ranunculus, all the flowers were white.

At length the party came to the last patch of yellow sandstone rock, beyond which stretched the upper plateau of the Ball Glacier. There they decided to pass the night, and, while Kaufmann and Boss went on to reconnoitre, Mr. Green took some photographs and sketches. Soon the men returned, saying they feared it hopeless, but, as they wished Mr. Green to judge for himself, the three set off and soon reached the saddle. A magnificent view, which Mr. Green likens to that of the Schreckhorn, met their gaze—the Hooker Glacier, and beyond it Mount Sefton; further off the Mueller Glacier, and, but for a ridge connecting Mount Sefton with Mount Stokes, the western sea could have been seen. The saddle contracted to a narrow arête, along which the three crawled until the first rock-tooth, of tottering splintered slate, was reached and climbed with great difficulty and danger. The ridge connecting this with the next spike was so loose that it trembled beneath their feet, and made climbing farther madness, so, after a discussion, the party shouldered swags and returned to the camp, examining as they descended the cliffs on the other side of the Ball Glacier, and being fortunate enough to discover a snow-filled couloir, by the side of which they hoped to be able to find a way up to the plateau over the Hochstetter Falls, and so on to the northern arête.

On the 27th, at daybreak, they were again on their way, gained the surface of the Ball Glacier, crossed it, and commenced the climb up the side of the couloir. It proved impossible to get round the spurs to the Hochstetter Glacier, and a halt for refreshment and consideration was made. The warmth of the sunshine caused many avalanches, one of which nearly buried the party. The Hochstetter Ice-fall was now on the right, and it was plainly necessary to ascend higher to reach the plateau. An open bergschrund was in the way of their reaching a snow couloir, so the rocks to the left were tried, though it was difficult to avoid the loose stones. At last no further progress could be made, and a retreat was made to the snow-slope, where steps were cut over the bergschrund, and the couloir gained, the top of which was reached after an hour's step-cutting. There, on the first piece of rock met with for 2,000ft., they halted for rest. •Upwards, after dropping their knapsacks, they scrambled, now 8,000ft. above the sea, and reached some great vertical slabs of sandstone. Kaufmann went on ahead to see if these were practicable, but, after a perilous climb to the top of a crag to see over the ridge above, he decided that to go on was impossible.

One other way remained: to descend about 3,000ft. to a different couloir, reach the lower cliffs, and work to the right, but as it was not certain that way also might not end in failure, and would again involve loss of time, and as from where they stood they could see the Mount Tasman route was quite practicable, they descended again to the camp, resolved to make another attempt.

After ten hours' climbing on the 1st March, a halt was made among the topmost rocks of the Mount Tasman spur. Though the couch was hard, the three mountaineers, after a smoke and some Liebig, dozed till the morning, which proved at first foggy. After crossing the ridge separating them from the Hochstetter, every cloud had vanished, and a wonderful view lay before them. Mount Cook and the cliffs of Mount Tasman, cut off from them by an ice-field two miles wide and about six miles long, having no large crevasses except where it began to round off to the ice-fall, though some long, narrow, and immensely deep ones cut the length of the field. A glacier—called by Mr. Green the Linda Glacier—between Mount Cook and Mount Tasman seemed to promise the means of reaching the arête, and an could discern the coast-line south of Hokitika, and the belt of flat land which fringes the western slope of the Southern Alps. We could dimly recognise parts of the great eastern plain, nearly all Canterbury and Westland being visible. We could trace the great mountain-chain from Nelson to Otago, and survey the land from sea to sea. The grandeur of the scenery around aroused in us an idea of the sublime; we felt ourselves nearer to the Absolute, and felt proud and happy with the thought that all the grand glaciers and rocks around we had conquered by our energy and skill."

Dr. Lendenfeldt made a survey of the Tasman, and measured the height of principal peaks. He also published a capital map of the glacier.

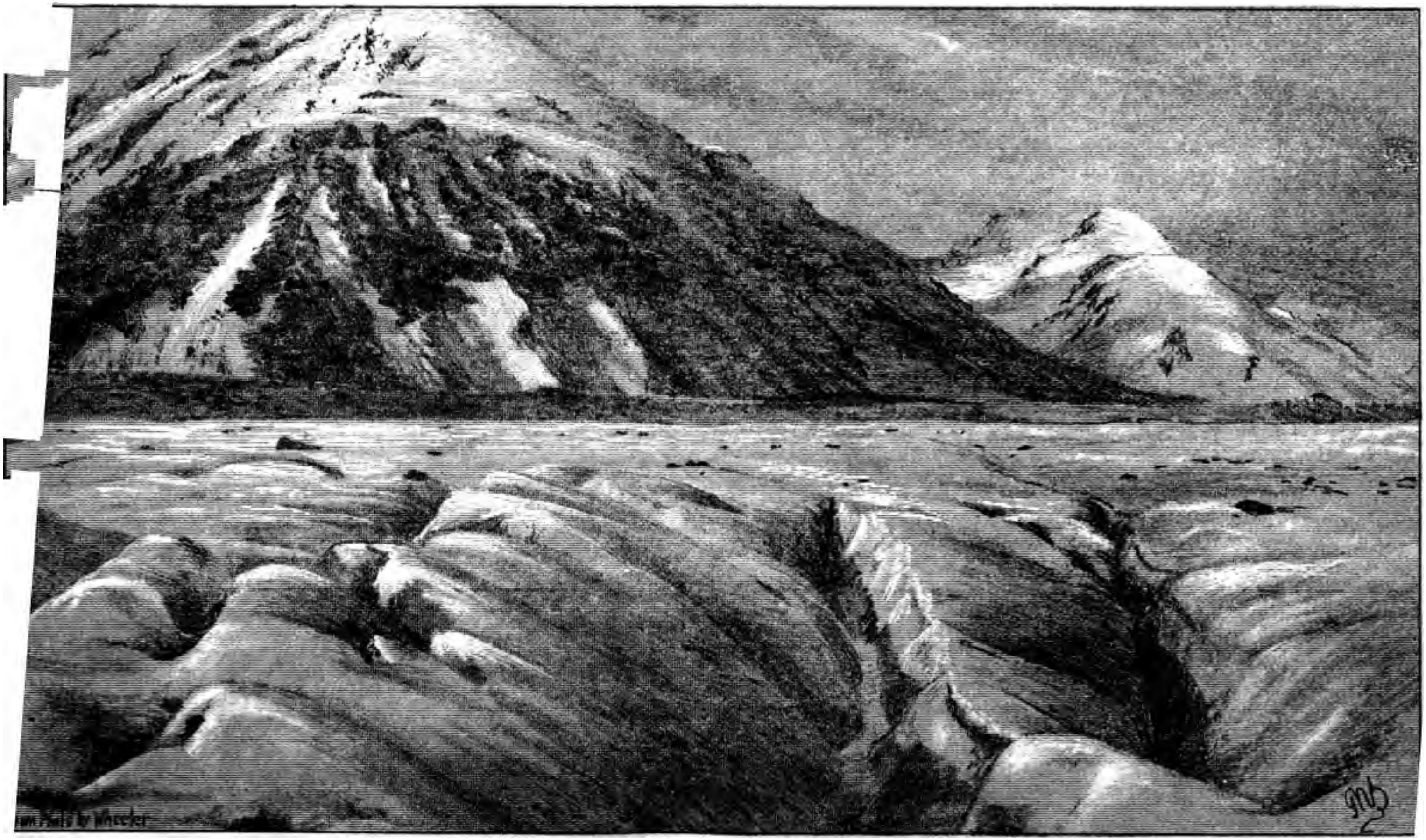
Following in Mr. Green's footsteps came Mr. G. Mannering, of Christchurch, who made repeated expeditions to Mount Cook with the view to making a complete ascent. In December, 1890, he succeeded, with Mr. Dixon, in reaching the final ice-cap of the mountain, although the actual summit was not attained. The undertaking, considering the fact that there were only two in the party, and that the mountain was not in a good state for climbing, was rather a perilous one. Mr. Mannering and Mr. Dixon left Christchurch on the 1st December, and, crossing the Tasman in their canoes, in which they afterwards returned home down the Waitaki, reached Birch Hill Station the following night. At the Hermitage they were joined by Annan, who had already swagged most of the baggage up to the Ball Glacier camp, and, crossing the wire rope over the Hooker, they camped for the night near the terminal face of the Tasman Glacier. On the 5th December, after making up swags, and seeing to boots, ice-axes, and snow-goggles, the party crossed the lower parts of the Ball and Hochstetter Glaciers, and reached the foot of Mount Haast, from which the climb commenced. There a small supply of provisions was left, in case of stress of weather forcing a retreat.

The heat was intense, and the avalanches consequently numerous, falling rocks and stones often passing quite close to the climbers. The snow, too, was in bad condition, loose and slushy, obliging them now and then to avoid it as much as possible. The place decided on to bivouac was slightly lower, though on the same ridge as that mentioned by Mr. Green, and from here Annan elected to return to the camp. In January, 1890, a cache of provisions had been left by Mr. Harper and Mr. Mannering, which were now found in a perfect state of preservation. With the help of the ice-axes the calico tent was pitched on a floor of small rocks and ice, on which, however, they were able to sleep in comparative comfort, after some hot drinks had been brewed by means of the Aurora lamp. By 4 o'clock next morning Dixon and Mannering were on their way to attempt the ascent, which for the first part led along a rocky ridge with snow-slopes on either side, slanting towards the Hochstetter Ice-fall and the Freshfield Glacier respectively. The Lady's Foot, two or three rocks protruding from a huge snow-saddle, was soon reached, and between two of these they gained the ridge again, beyond which rose, 500ft. above, a dome of glacier. After two hours' arduous step-cutting the summit of this was gained, and they found themselves overlooking, in the face of a bitter south-west gale, a great plateau. To climb further in such a wind was madness, so by 7 o'clock the bivouac was reached, and the rest of the day spent in sketching and admiring the wonderful scenery that lay around. Annan was sent back to his work; he had done yeoman's service in swagging.

Next morning the plateau was again reached, the gale having blown itself out the previous day, and a marvellous panorama of Mount Cook and the Tasman was seen. Only seven men—four of them New-Zealanders—have been privileged to gaze upon this wonderful scene. The crevasses now obliged the two mountaineers to use the rope, and very slow progress was made over soft snow, with constant détours to avoid a chaos of séracs or blocks of broken ice; but by now they were well round the corner of the Linda Glacier. From here Mount Cook stands right ahead, a massive ice-peak, from the right-hand of which a rocky arête connects the main ridge with Mount Tasman. On the left descends the great northern arête, from which slope steep faces of ice set with immense red-sandstone blocks separated by two great ice-filled couloirs. Up these lay the route described and sketched by Mr. Green, and which Mr. Mannering and Mr. Dixon resolved to follow. While even if time permitted, the fog below would have prevented further progress, the party returned to the top, and left a record in the shape of a cairn and bottle on the rocks to the left of the saddle. The return had to be made almost at once, in order to get over before dusk some crevasses which it was feared would have opened during the day. Mr. Blakiston led the way down, both having to descend backwards, without experiencing much difficulty in finding the steps, as there had been scarcely time for them to fill up. The return journey was easy until near the last slope, in which some ten crevasses had either opened or had their snow bridges broken in, owing to the intense heat prevailing during the day. These, however, gave a good deal less trouble than had been anticipated, and the camp was regained at 7.30 p.m.

There have been two or three attempts made to gain this saddle before Messrs. Harper and Blakiston tried it last month, which were unsuccessful, chiefly owing to the number and width of the crevasses opposite Baker's Saddle, some five hours from the top. These were, however, fairly easy to cross, owing to the fresh snow which had fallen during the previous bad weather having formed bridges over them. The present map of the Hooker Glacier was found to be slightly incorrect as to the head basin of the glacier, which will have to be shown a trifle larger, and also because Mount Hector—which does not appear on the map—was seen rising perpendicularly out of the head basin.

Mr. Harper thinks that this ascent would be very difficult, and, in fact, almost impossible, later on in the summer, owing to the crevasses being more open. The ascent of St. David's Dome seemed quite practicable from the saddle. The ice face, up which the steps had to be cut, was the only really difficult piece of work, and was made decidedly uncomfortable by the showers of small ice which were constantly coming down, and which, owing to the steepness, rendered it very difficult to look up without being struck in the face. The next morning was occupied in returning with swags to the Hermitage, which was reached just before it began to rain again from the north-west. Had the weather been at all settled, the party think they might have succeeded in reaching the coast, but,


om Photo by Wheeler

t above the Hooker Glacier, I found it growing in great fusion. Mr. Mannering also found it in large quantities ing his exploration of the Murchison Glacier. In the space at disposal I cannot, however, give any adequate idea of the New land alpine flora. Indeed, it would require a separate volume to do it anything like justice. On Mount Torlesse, for instance, Dr. Haast, during his early explorations, collected over two ndred flowering plants, over thirty of which were new to ence. There are no doubt many new discoveries still to be de. In 1888, for instance, when exploring in the country, had the good fortune to discover a new species of celmisia, ich has been described by Mr. F. R. Chapman; and Professor le, during his visit to the Southern Alps some years ago, a beautiful ranunculus, which is not described in any of botanical works on New Zealand flora. No doubt as the explored country is opened up other important discoveries of imilar nature will be made.

The birds of the Mount Cook district are particularly eresting to the naturalist, while the ordinary traveller will o be greatly interested in studying them and their habits. The ka, one of the wingless birds for which New Zealand is lebrated, is most comical and interesting. Then there is the a, or mountain parrot, which in some districts kill sheep in rge numbers for the purpose of making a meal of their kidney t. Kakas and wood pigeons are also met with, while the tui, ell-bird, and other songsters fill the woods with music on a fine y. In Buller's "Birds of New Zealand" a great deal of very teresting information regarding the feathered inhabitants of e locality is to be found, while good specimens of all the birds an be seen in any of the principal museums.

APPENDIX.

SURVEY WORK IN THE SOUTHERN ALPS.

THE New Zealand Survey Department, which is widely known for the excellence and thoroughness of its work, is year by year putting us in possession of a great deal of valuable information regarding the glaciers of the Southern Alps. Mr. T. N. Brodrick is the gentleman to whom has been allotted this important work. The following extracts from his recent reports will prove of interest.

In a report on the Tasman Glacier he says,—

This glacier, the largest in New Zealand, is 18 miles long, and has an average width of 1 mile 15 chains: the widest place, which is opposite the Murchison Valley, is 2 miles and 14 chains; the narrowest, just above the junction of the Rudolph Glacier, is only 60 chains. To insure accuracy in the survey and to leave permanent marks which might be of use hereafter, the triangulation was extended up to the Hochstetter Icefall. The remainder of the survey was conducted by carrying a set of triangles up each valley. The lettered marks on the plan indicate the stations; they were only marked on the ground by a cairn of stones, but the triangles were calculated, because on their accuracy depended the heights of the surrounding mountains, &c.

It is always more or less difficult, in making a survey up a narrow valley, to tell when the highest point of a mountain is visible; to assist in ascertaining this, we ascended the Hochstetter Dome and fixed station Z, 9,179ft. above the sea-level. Many of the peaks on the main range present to the Canterbury side such a rounded appearance that it was very difficult to make sure that my observations were taken to exactly the same point, and it is satisfactory to find how nearly my heights agree with those calculated by Mr. Roberts, from the West Coast side—viz., Mount Dampier, which is, I think, our Hector, 11,323ft.–11,287ft.; Tasman, 11,475ft.–11,467ft.; Haidinger, 10,107ft.–10,063ft., 9,183ft.–9,121ft.: De la Bêche, 10,058ft.–10,040ft., 8,744ft.–8,777ft., and 8,752ft.–8,704ft.

An exact traverse of the terminal face of the Tasman was made on the 21st November, 1890, commencing at sub-trig. Y, which is a large peg with a circular trench round it. I noticed a considerable

ACIER
HAECKEL PEAK
G
E
MT HAMILTON

change in many places since 1889, but years must elapse before the question can be decided for certain; small fluctuations are sure to occur annually from various causes.

The dotted red line along the west of the Tasman marks the horse-track to the tourists' hut, at the Ball Glacier, which we made this season, and about which I have already reported to you. The hut is on the site of Green's fifth camp, which I consider to be the safest place available; the spur above it is not high enough for the snow to avalanche to any considerable extent, and an examination of the ground shows that it never has done so. I am afraid there is some chance of damage to be apprehended from the possibility of the soakage from the Ball Glacier forming a small lake between the moraine, the hill, and the shingle slip. However, no place is absolutely safe, and I believe the present site to be the best which could be found; later on I shall say something about the continual changes which are taking place, and it will give you a better idea of the impossibility of saying any particular place is safe. The hut is 19ft. long and 12ft. wide, and divided into two compartments; each compartment has four bunks in it, and a large tin-lined box for blankets, &c., and table. The hut is strongly built of corrugated iron and lined with Willesden roofing-paper. Any one who has been over the road will understand what a tedious job packing and carrying the material up to the site was; most of it had to be carried by the men; only the short pieces could be packed; and it is rather a wonder the animals would carry what they did: for instance, the long iron by which the horse was completely covered all except his legs, the poor brute having to keep his head in one position all the time.

The red line from Trig. Z to Mount Cook marks the route taken by Mr. Green in 1882, and Messrs. Mannering and Dixon in 1890, when making the ascent of the mountain. It will be seen from the plan that, although the distance is short, the track is a very steep one, especially from the ice-plateau to the summit. I did not visit the plateau, but its height above the sea-level, where the track crosses it, may be taken to be about 7,000ft., for the point marked 6,903ft. is a rock which is level with the ice-plateau at that place. As the distance to the highest point of Mount Cook is only a little over two miles from the above point, and the rise 5,349ft., the average slope is about 1ft. to 2ft. I am indebted to Mr. Roberts (West Coast Survey) for a plan showing that David's Dome branches from Mount Hector instead of Mount Cook. When I made the survey of the Hooker Glacier I could not get far enough up to see this, but it looked to be a spur of Mount Cook, which I showed it to be. Messrs. A. Harper and Blackiston, who ascended the Hooker Saddle this season, also noticed the same thing, and told me of it on their return; Mount Cook is therefore not on the main range, and is in the Provincial District of Canterbury.

On the map will be found transverse sections of the Tasman Glacier, drawn to a natural scale taken at points C, D, E, and of the Murchison at A. As they are numbered to correspond with the general map they can easily be traced; the black surface represents the moraine-covered portion, the blue the clear ice, and the black chequered part at the ends of the sections the lateral moraines.

You will see the Tasman is thickly covered with moraine matter; but, except at the sides where large lateral moraines have accumulated, I have every reason to believe the covering is not very thick, and I should say does not average more than from 18in. to 2ft.

From line D to abreast of sub-point T the glacier is very much crevassed along its eastern side; and although crevasses exist in many other places, there is nothing to compare with the huge system I have mentioned. The widening out of the Tasman into the Murchison Valley is very ancient, the lateral moraine there being covered with grass and scrub, but just under Trig. V will be seen a small stream running from the glacier into the Murchison River. This comes from an ice face, and very likely marks the beginning of one of the constant changes to which I previously referred. In 1889 the ice of the Ball Glacier was much lower than it is now. Its advance has broken down the lateral moraine of the Tasman, about 15 chains below the hut; and from the gap a small stream now runs into the hollow between the glacier and the hills, also in several other places. The western lateral moraine has recently made gaps with small streams issuing from them, which seem to indicate a tendency of the current to set more to the west than it has done for a very long time.

The western lateral moraine is very high, and from where I have marked "Huge rock," down to the blue lakes, is several chains in width, and its face in many places covered with scrub. The stream which runs into the Tasman near Trig. X and the blue lakes are fed by percolations from the glacier. The hillocks marked "Old moraine" near the hills are very ancient, and were once covered with scrub, which was burnt off by Nicolo Radove, who sowed cocksfoot grass afterwards; the grass has taken uncommonly well, and there is now fine summer feed all over them. Mr. Mannering kindly lent me Dr. von Lendenfeld's map of the Tasman Glacier, published in 1884; I am, therefore, able to remark the great change which has taken place on the surface of the glacier since that time. In 1884 there were two deep depressions, with surface streams running in them, the deepest being near the middle of the glacier. The surface stream from this discharged itself over the terminal face. The depression is shown to be the clear ice of the main glacier, which reached a point within two and a half miles of the terminal face; the other hollow was more to the west, and was the clear ice of the Ball Glacier, which also extended to within two and a half miles of the terminal face, though the stream found its way under the ice before it reached the moraine. Now, a glacier at sections C, D, E shows that the depressions have disappeared, and with them the surface streams, while the clear ice has receded respectively 4 miles (or 6½ miles from the terminal face), and 1½ miles (or 4 miles from the terminal face).

The speed of the Tasman was determined by rods set in the ice along the lines C, D, at the numbered points on the 5th December, 1890, and reset again on the 7th January, 1891. That of the Murchison by rods set in a similar manner along line A. The results are recorded in the appended Table No. 2. Here I had better call your attention to a clerical error which was published in my report on the rate of the Hooker Glacier, in order to have it put right this year. It was corrected at the time, as far as Canterbury was concerned, but I regret to say the reports had been distributed to the other provinces before it was discovered. The rates, instead of being so many feet and inches, should have been inches and decimals. The correct rate will be found in the attached table. The green colour on the plan represents scrub, with a few trees amongst it towards the lower part of the glacier. The highest point at which I have seen vegetation growing is 6,500ft., and I doubt if it ever grows at a higher elevation in this part of the country.

As the Government has spent some money in opening up these glaciers, it may perhaps not be out of place for me to make a few remarks on the tourists' traffic. His Excellency the Governor visited the Tasman in January, and was the first to ride up the new track. As it was then incomplete the horses had to be left two miles below the hut, and the remainder of the journey to the Hochstetter Icefall was performed on foot. His Excellency expressed himself as very much pleased with the scenery. Since that time many tourists, both ladies and gentlemen, have taken advantage of the facilities afforded by the track and hut to see the wonders of the Tasman, and from what several told me I am inclined to think the money spent will have the effect of increasing the number of visitors. Should it be the intention of the Government to spend any more money, I should like to recommend that the track up the Hooker be carried about four miles further up the glacier, and a shelter hut erected there. At present many tourists never get to the clear ice, and go away disappointed, and with the impression that our glaciers are entirely covered with moraine, and are not worth seeing. This does the traffic harm. The present tracks have done a good deal for the place, but I think not enough. In the time to come a visit to the Hochstetter Dome will no doubt be numbered among the regular trips. From this point a magnificent view is obtained, not only of the East but of the West Coast. The ascent is an easy one, and with common care there is no danger to be apprehended. It has already been visited by one lady (Madame Lendenfeld) in 1883, who accompanied her husband, Dr. von Lendenfeld, when he was making his survey of the glacier. Any one trying the ascent will find it necessary to camp for one or two nights on the Malte Brun River, below point *r*, where we left a good stout tent-pole. From this point it is an easy three hours' walk to the Lendenfeld Saddle, and three and a-half from there to point *z*, with only about two hundred and fifty steps to cut.

TABLE I., SHOWING COMPARATIVE SIZES of the CANTERBURY GLACIERS.

Name.	Area of Glacier.	Area of Country from which Supply of Ice is drawn.*	Length of Glacier.		Average Width.		Greatest Width.		Narrowest Width.	
	Acres.	Acres.	Mls.	Cs.	Mls.	Cs.	Mls.	Cs.	Mls.	Cs.
Tasman ...	13,664	25,000	18	0	1	15	2	14	0	60
Murchison	5,800	14,000	10	70	0	66$\frac{7}{10}$	1	5	0	42
Godley ...	5,312	10,560	8	0	1	3	1	55	0	58
Mueller ...	3,200	7,740	8	0	0	50	0	61	0	37
Hooker ...	2,416	4,112	7	25	0	41$\frac{3}{10}$	0	54	0	30
Classen ...	1,707	3,972	4	70	0	43$\frac{3}{4}$	0	73	0	21

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* This is not the whole watershed, but only that portion on which the névé snow lies.

Alletsch, in Switzerland, according to Ball, in "Alpine Guide"—Length 15 miles, average width 1 mile. I think, most probably, if the average width was obtained by first calculating the area in the manner I have done, this glacier would be found to be much narrower. Ball says it is "fully a mile wide;" but without actual measurement it is not reliable.

TABLE II.—RATES OF GLACIERS.

Tasman.

D, near the Ball Glacier; rods first set on the 5th December, 1890, and reset again on the 7th January, 1891.

—	Total Movement.	Average Daily Rate.	Remarks.
	Ft.	In.	
ion 1	27·2	9·9	The numbers correspond with those on the plan.
ion 2	41·0	14·9	
ion 3	47·7	17·3	
ion 4	48·4	17·6	
ion 5	49·6	18·0	
ion 6	46·9	17·0	
ion 7	44·2	16·1	
ion 8	38·3	13·9	

C, ranged from point of Malte Brun Spur; first set on 5th December, 1890, and reset on 7th January, 1891.

	Ft.	In.	
ion 2	6·5	2·4	The numbers correspond with those on the plan.
ion 3	25·9	9·4	
ion 4	28·7	10·4	
ion 5	32·7	11·8	
ion 6	36·6	13·3	
ion 7	33·7	12·2	
ion 8	34·4	12·5	
ion 9	29·0	10·5	
ion 10	25·4	9·2	
ion 11	13·9	5·0	

Murchison.

A, ranged from point above the Dixon Glacier; first set on the 9th December, 1890, and reset forty-eight hours afterwards.

	Ft.	in.	In.	
on 78	0	1	0·5	The numbers correspond with those on the plan.
on 79	0	7	3·5	
on 80	1	4	8·0	
on 81	1	5½	8·7	
on 82	1	2	7·0	
on 83	0	9	4·5	
on 92		9·2	4·6	
on 93		5·2	2·6	

Hooker.

Line ranged from peg (f) on a bearing of 101° 43′, rods set at fairly regular distances apart on the ice; first at 12 a.m. on the 4th April, 1889, and again on the 7th April, 1889, at 8 a.m.

——	Total Movement.	Average Daily Rate.	Remarks.
	In.	In.	
Station 1	3·3	1·1	The Stations are numbered from west to east.
Station 2	8·2	2·9	
Station 3	12·0	4·2	
Station 4	15·4	5·4	
Station 5	12·8	4·5	

Mueller.

Marked stones, first observed on the 29th March, 1889, and again on the 14th November, 1890.

——	Total Movement.	Average Daily Rate.	Remarks.
	Ft.	In.	
Station 1 ...	239·3	4·8	See other reports.
Station 2 ...	271·7	5·5	
Station 4 ...	262·6	5·3	
Station 5 ...	359·6	7·3	
Station 6 ...	398·0	8·0	
Station 7 ...	611·0	12·3	
Station 8 ...	506·0	10·2	
Station 9 ...	409·0	8·2	
Station 10 ...	388·6	7·8	
Station 11 ...	146·1	2·9	

Tasman Glacier.—In accordance with your instructions, I ranged the two lines drawn on the tracing across this glacier, first on the 5th December, 1890, and again on the 7th January, 1891; the average rate per day is as follows: Line from the lateral moraine of the Ball Glacier—Station 1, 9·9in.; station 2, 14·9in.; station 3, 17·3in; station 4, 17·6in.; station 5, 18·0in.; station 6, 17·0in.; station 7, 16·1in.; station 8, 13·9in. Line from point of Malte Brun Spur near Trig. V.—Station 2, 2·4in.; station 3, 9·4in.; station 4, 10·4in.; station 5, 11·8in.; station 6, 13·3in.; station 7, 12·3in.; station 8, 12·5in.; station 9, 10·5in.; station 10, 9·2in.; station 11, 5·0in. In the imperfect state of the survey of this glacier, it is perhaps better not to try to describe it, so I will only remark owing to the clouds below, it was almost impossible really to form an idea whether the descent to the coast would be practicable.

CHAPTER VII.

GEOLOGICAL, BOTANICAL, AND ZOOLOGICAL.

WHILE the beauty and grandeur of the scenery will always be the principal attraction for the majority of visitors to Aorangi, it must not be forgotten that the locality abounds in objects of special interest to the geologist, the botanist, and the zoologist. The glaciers are among the largest in the world, outside of the Polar regions; the alpine and sub-alpine flora is of the most beautiful and diversified character; and the fauna, though somewhat limited, is strangely interesting.

In the vicinity of Mount Cook, within easy distance of the Hermitage, glacier-action can be studied in all its varied and most interesting forms. In the words of Dr. von Hochstetter, we have here one of the most remarkable objects which has been reserved for the physico-geographical and geological investigations of our time. Large as the glacier system is at the present day, it is, however, remarkably small as compared with the vast extent of the glaciers which filled the valleys and descended far down the plains in the Pleistocene period. The ancient moraines and well-defined *roches moutonnées* met with far beyond the termination of the present evidences of glaciation are unmistakable evidence of the older ice-fields, when the great mountain-peaks were evidently much higher than now. From the maps accompanying this work it will be seen that the greatest accumulation of ice and snow lies at the head of the Tasman and Murchison Glaciers, on the eastern side of the main range of the Alps. The Mueller, the Hooker, and the Godley Glaciers, on the same side, are, however, likewise of large extent; while on the western side of the Mount Cook Range there are other glaciers of large size, one of which—the Franz Josef Glacier—descends to within about

600ft. of the sea, and has beautiful tree-ferns, and a vegetation which appears almost semi-tropic, growing within a few yards of its terminal face.

One peculiar feature of the Southern Alps is the absence of any number of sub-alpine passes over the main range. Indeed, so far as I know, there are only three passes—the Haast Pass, leading from Lake Wanaka to the West Coast; the Hurunui Pass, dividing the sources of the river of that name; and the Teremakau and Arthur's Pass, over 3,000ft. high, over which the coach runs through the wonderful scenery of the Otira Gorge to Hokitika and Greymouth. According to Mr. E. Dobson the absence of passes is to be accounted for by the very peculiar structure of the central chain. He says the first point to be noticed in regard to the central chain is that it does not, as is popularly supposed, present an unbroken line of watershed, but rather a series of peaks and broken ridges, separated from each other by deep ravines, and for the most part perfectly inaccessible. The clue to this system of ravines and ridges is to be found in the fact that the Palæozoic rocks forming the main range have been at a very early period subjected to extensive pressure, the effect of which has been to crumple them up into huge folds, the upper portions of which have been removed, leaving the remaining portions of the strata standing up on edge, either in a vertical position, or at very steep inclinations. The strike of the beds, corresponding with the direction of the axis of the foldings, is tolerably regular, being generally about N. 28° E. (true), thus differing from the general direction of the dividing-range by 33°. At the same time it is important to observe that the rule which has been found to prevail in other mountain-chains of similar formation appears also to hold good in the central chain—viz., that the greatest amount of denudation has taken place along the original ridges, which are now occupied by valleys, whilst the existing peaks and ridges are on the sites of former depressions.

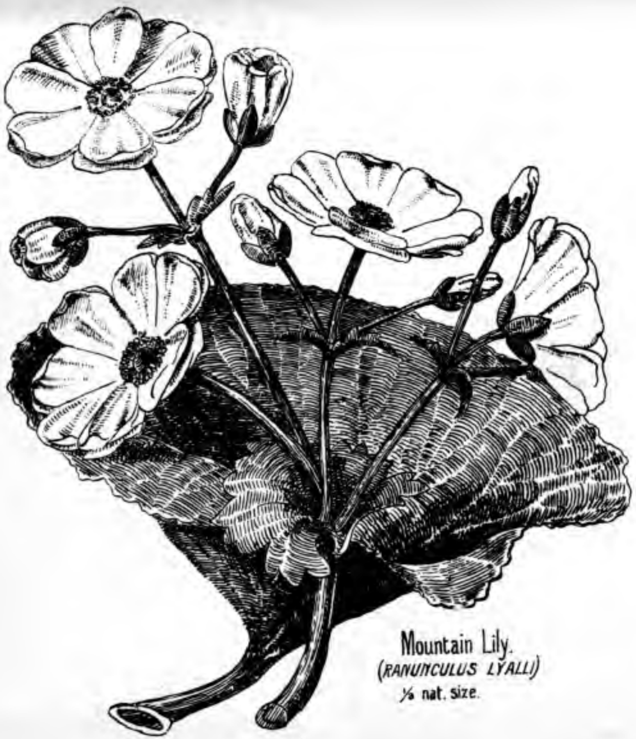
The next feature to be noticed is the jointed structure of the rocks. Although the joints cross each other in all directions, apparently without order, there are two prevailing systems of joints, which have an important influence on the configuration of the surface. These are: First, a system of vertical cross-joints at right angles to the stratification, and running in unbroken lines for great distances, with such regularity that they might easily be mistaken for planes of stratification were it not for the frequent occurrence of beds of trap-rock, the outcrop of which marks unmistakably the true bedding; secondly, a system of joints, more or less inclined to the horizon, not running in parallel planes, but arranged in a series of curves radiating from a common centre.

The effect of this system of jointing, combined with the strike of the beds, or the direction of the axis of folding, is to produce two distinct systems of valleys in the central chain, the direction of which is very remarkable. The one radiates from a common centre, situated about fifty miles north of Mount Darien, in the sea near Cliffy Head. This system includes all the principal valleys from the Teremakau on the north to the Makarora on the south, their direction varying from N. 82° E. to S. 30° W., giving the idea that the country has been starred, just as a mirror is starred by a violent blow, or, as in rock-blasting, a set of radiating fissures is sometimes produced by a single shot. To the other system belong the valleys of rivers and watercourses, running either on the strike of the beds, or in the direction of the cross-joints, or in a compound zigzag course, following alternately these two directions like a line struck diagonally across a chess-board, but following the sides of the squares, and giving to the cliffs which bound these valleys a peculiar rectangular appearance, resembling ruined masonry on a gigantic scale.

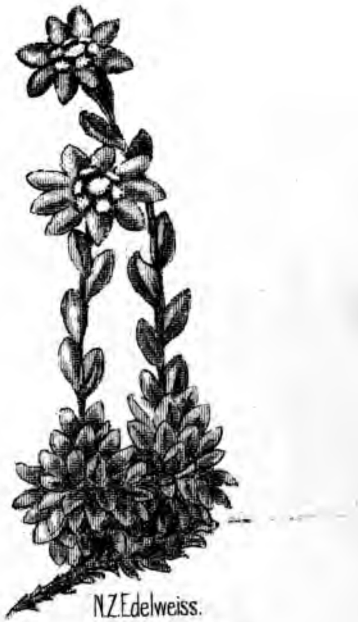
According to Dr. Haast, the western slope and part of the central chain consists of crystalline rocks and metamorphic schists, highly auriferous, and resting on a basis of granite, that presents itself here and there to the view in the rugged bluffs and declivities on the West Coast. To the eastward of the crystalline zone stratified sedimentary rocks appear, such as slates, sandstones, conglomerates, indurated shales interstratified with trappean rocks of a dioritic or diabasic nature. These compose by far the greater part of the eastern side of the central chain, exhibiting everywhere huge foldings. This extensive formation of sandstones and slates in some places is overlaid unconformably by a carbonaceous system. The extensive development of limestones such as are peculiar to the European

Alps is totally lacking, and it is easily seen that only the eastern half of a complete mountain system has been preserved, while the western half is buried in the depth of the main. The eastern foot of the mountains is formed by tertiary and alluvial deposits, broken through by volcanic rocks. The period of volcanic energy was one of upheaval; and since it closed we see no evidence of there having been submergence of the Island on the east side, whilst on the West Coast the evidence derived from the mountains rising directly from the sea, and penetrated by the fiords, indicates rather a gradual submergence.

At Mount Cook the botanist has a splendid field before him. The alpine and sub-alpine flora is of the most beautiful and diversified character, and to the traveller making his first visit from Australia or the Northern Hemisphere it will also have the charm of novelty. Among the shrubs there is considerable variety, and many of the bushes are during the autumn laden with prettily-coloured berries, among these the totara, with a sweetly-flavoured edible crimson berry, being most noticeable. *Discaria toumatou,* a thorny shrub, known among the settlers as the "wild Irishman," is also prominent, and occasionally, in one's twilight wanderings on the hillsides, painfully obtrusive, as is also its neighbour, the "Spaniard," or bayonet-grass—*Aciphylla colensoi.* There is quite a bewildering variety of veronicas, coprosmas, olearias, senecios; and the cassinia and panax family are also represented. Among the larger trees, a variety of beech (*Fagus cliffortioides*) is most prominent. The pretty green foliage of the broadleaf is also conspicuous, while among the Coniferæ may be mentioned *Phyllocladus alpinus, Podocarpus nivalis,* and *Dacrydium colensoi.* But it is probably among the herbaceous plants that the botanist will delight most to linger. Four or five kinds of ranunculus are to be met with, and among them, growing in great profusion at every turn, is the *Ranunculus lyalli,* the king of the Ranunculaceæ. Celmisias also abound, from the tiny thin-leaved kind to the larger varieties, with their beautiful flowers and broad silvery leaves. Edelweiss grows luxuriant, at an elevation of about 3,000ft. above sea-level. During my expedition to the Tasman I secured several splendid specimens in the vicinity of Green's fifth camp, and afterwards, on the Mount Cook Range, some few hundred



Mountain Lily.
(RANUNCULUS LYALLI)
½ nat. size.



N.Z. Edelweiss.
about nat. size

that the widening out of the glacier into the Murchison Valley is very ancient; the lateral moraine there is covered with grass and scrub, and the glacier seems inclined to break through the lateral moraine along its western side in several places.

The Murchison Glacier.—The terminal face of this glacier is situated about five miles north-east of the lateral moraine of the Tasman Glacier, it is 3,308ft. above sea-level, and the ice face above the outlet of the river is 193ft. high. The Murchison river-bed is a very smooth one, with a fall of about 100ft. to a mile, whilst the average fall of the Tasman Glacier, of which the Murchison is an affluent, to the Pukaki Lake is only 23ft. per mile. In the valley, vegetation grows at an altitude of about 6,000ft., and dense scrub at 4,000ft. In its present state the country, even were it accessible to stock, which it is not, is valueless, though on patches which had been burnt a fine native grass, resembling Italian rye, was growing luxuriantly. No plants were found which are not common to other parts of the mountains, except an Alpine variety of anise, which I do not remember having seen before. A stratum of bright-red rock crops up in several places along the Liebig Range. I have shown it by a red mark in five different places: the first just opposite the terminal face of the Murchison, the last high on the range, nearly in line with the northern portion of the "bulge" of the Tasman Glacier. It is also visible between Mount Blackburn and Trig. T. The speed of the Murchison was obtained by ranging the line marked on tracing from the spur above the Dixon Glacier. The numbers along the line represent the rods set. They were put in on the 29th of December, and were reset two days afterwards. The average rate for twenty-four hours was—No. 78, ·5in.; No. 79, 3·5in.; No. 80, 8·0in.; No. 81, 8·7in.; No. 82, 7·0in.; No. 83, 4·5in.; No. 92, 4·6in.; No. 93, 2·6in.

I have now been over all the most important glaciers in Canterbury, and a great many of the smaller ones as well; but I should say that the Murchison, for reasons which I shall try to enumerate, is the best field for scientific research. To begin with, its moraine is composed of different-coloured stones, lying in sections, the most conspicuous of which I have drawn on the plan. From the many views I had of the glacier from points on the hills surrounding it, I was always able to distinguish the particular features which I have shown, and they are placed by observations taken with the theodolite from fixed points. We had such bad weather while we were on this glacier that I could not afford to waste any time, or I might have marked the line of larger hillocks forming the medial moraine between the main and the Malte Brun Glaciers as far as the red band. The two semi-crescent-shaped patches shown in red and burnt sienna are most distinct, and of the form represented on the tracing. The red evidently came from the Cascade Glacier, for its moraine is of the same coloured rock. The burnt sienna either came from the same place or from the Baker Glacier; the latter, I think, for a small quantity of the same kind of rock is scattered along the northern moraine of the Baker. The large medial moraine (sepia) is smoother than any I have seen on other glaciers, and from (84) to (86) a horse might be ridden along it. The stones are in general small: there is also a large quantity of mud on it. The height is from 60ft. to 90ft. The general appearance of a section would be like that of a formed road—that is, a gradual rise to and slightly flattened crown. Between this moraine and the spur north of the Dixon Glacier a large surface stream often runs, finding its way under the glacier, but by no fixed opening, just below No. 78. There is also a small stream on the other side of the moraine; but it is to the first mentioned I would draw your attention. It is swift, and many perfectly water-worn stones are in its bed. Water-worn stones are to be found throughout the whole length of the main moraine, but, so far as I could see, only on the eastern side. The first pile of them is lying a little below Station 80 on the ranged line; they are not to be found north of that point—at least I looked for but could not find any. To get from the bed of the creek to the place I have indicated the stones would have to be lifted about 100ft.; yet I believe that is the place they came from, and I think the Dixon Glacier in some manner pushes the ice up. The crevasses, marked by blue lines, where the clear ice ends are drawn in their correct positions. The current of the glacier sets towards the east, and has caused the large land-slip shown on plan. The rocks on the glacier, especially on the eastern side, are grooved and scratched in all directions; this is uncommon on New Zealand glaciers. Many of the marks are deep and at right angles to the grain, if I may use such an expression. I saw some rocks wedged in between the ice and fixed rocks in the lateral moraine. The marks on them were very newly made, and were evidently caused by grinding against the latter.

The tributary glaciers differ from each other materially; the Onslow, nearest to the terminal face of the Murchison, is apparently stationary at present; the Cascade and Wheeler contribute nothing to the general stream, and have the appearance of dying out. The Baker and Dixon are advancing without any question, especially the former. The Mannering, Harper, and Aida have much the same look as the main glacier. There are one or two small glaciers on the west side of Mount Hutton, which, however, are dying away, and are only worth mentioning because they have complete lateral and terminal moraines, which is unusual for such small glaciers at their altitude. The Cass Glacier is only a rough sketch; the length is about right, but the distances are estimated. The Classen also is only a sketch, except between (91) and Mount Mannering, where it is fairly correct. The Baker and Dixon Glaciers have a peculiar ice formation, which I have not seen elsewhere; the dark-blue lines on them represent lateral ridges of ice about 40ft. higher than the rest of the glacier; these ridges are not more thickly covered with moraine than the ice between them, and their outside faces are free from stones, and very steep. At

Station 71, on the south side of the Baker, is the best illustration of what I mean: (71) is on the ice ridge; about 70ft. below it is a new lateral moraine in course of formation; this gradually sloping up merges in the ice ridge; below this is a hollow, and then at the bottom of the spur and following it round comes another small grass-covered moraine, showing that at one time this glacier was about 200ft lower than it is now, while three old moraines parallel to the glacier on the spur to the north point to the fact that it has also been much higher. The same signs of constant change may be seen near many of the other glaciers, but the Baker is the best example.

Mueller Glacier.—The map attached hereto shows the positions on the 29th March, 1889, and the 14th November, 1890, of the numbered stones on the above glacier, also the terminal face for the same dates. The stones were found again without any trouble; in many cases they had been carried down without displacing the rods which I put on them in 1889; and as they were only supported on the rocks by piling stones around them, it speaks volumes for the steadiness of the motion. Rock No. 4 has been split by the frost, and each piece has a number on it. No. 7 has slipped down into a large hollow, formerly it was on a ridge of ice; this accounts for its rather erratic motion, and of course it must not be used in estimating the rate of the glacier. The average daily rate of the stones is: No. 1, 4·8in.; No. 2, 5·5in.; No. 4, 5·3in.; No. 5, 7·3in.; No. 6, 8·0in.; No. 7, 12·3in.; No. 8, 10·2in.; No. 9, 8·2in.; No. 10, 7·8in.; No. 11, 2·9in.

I think the relative motions merely confirm what has been already found out by experiments elsewhere, although I do not know whether marks have ever been placed on ice, and their positions fixed in the same way that these have been; if not I would draw attention to the manner in which this method shows the direction as well as the speed of the current. Every care was taken in fixing the positions; different coloured flags were used when the number was invisible from the observing station; in some cases the same distance was calculated from two separate bases and each triangle checked by reducing the stations to the meridian and perpendicular of the trig. station. The changes at the terminal face are principally owing to the Hooker River, which continually alters its course; sometimes running under the ice, as it did in 1889, but more often simply following it round; whichever way it runs the effect is the same—the ice is eaten away underneath, especially in flood time, the upper part falls and great blocks of ice are carried away by the river: I have found them stranded 7 miles lower down. I draw your attention to this, for otherwise it would be difficult to account for the great and constant changes which take place. No doubt a larger amount of snow than usual falling in any particular year would eventually find its way to the terminal face and cause an advance; but the Mueller Glacier, on account of the river, is unsuitable for any experiments at its terminal face; it is also rough and difficult to traverse, but I have carried out your instructions and traversed it as closely as I was able. While on this subject I m remark that, accepting the mean annual rate of all the stones as fair basis for determining the speed of the glacier (that is twent six years to a mile), and allowing that the snow which falls near the terminal face than four miles is either melted by the heat wasted away by surface streams, and that Mount Sefton contribut nothing to the general stream within three miles of the face, then t snow which forms the most northerly portion of the terminal ice f eighty years ago; that at the middle might vary between one hundred and two hundred years, but none of it would be under one hundred years old. The most southerly portion would be between one hundred and one hundred and thirty years of age. I believe I am correct in this, because I take it that, when two glaciers meet, although they join together and form one stream, they never mingle. I do not know whether this fact would be disputed; I am too far away to be able to refer to a library, but a glance at the tracing of the Murchison Glacier and a perusal of my description of its moraines will convince any one that such is the case. As an instance of the magnitude of the ancient glaciers and the time they must have occupied this valley, it will suffice to say that, at the same rate of speed as the Mueller, the glacier which formed the moraine south of the Pukaki Lake took eight hundred years to carry a stone from the present terminal face of the Tasman to that place. I should say that the average thickness of the moraine lying on the Mueller is about 18in. It would be possible to calculate approximately how long it took this glacier to build up the large moraines between which it now flows.

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By Authority: George Didsbury, Government Printer, Wellington.